~~TOP SECRET//COMINT//TK//NOFORN//2029-1123~~

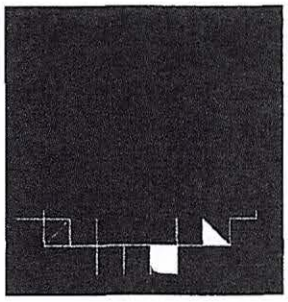
UNITED STATES CRYPTOLOGIC HISTORY

Special Series
Volume 9

The Foreign Missile and Space TELEMETRY Collection Story - The First 50 Years

Part Two: The 1970s, 1980s, and 1990s

Richard L. Bernard



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NATIONAL SECURITY AGENCY

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(U) Chapter 3
Improved Worldwide Performance (1980s)

(U) Overview

~~(S//SI//TK)~~ The 1980s can be characterized by relative stability of the collection resource set of facilities, but they had to cope with the increasing scope and complexity of the Soviet, and 1.4(c) the PRC target set. Figure 66 shows 1.4(c) 1.4(c) 1.4(c) In 1980 DEFSMAC detected and reported on 1.4(c) missile and space events and issued over 1.4(c) reports on those events.[48] Figure 67 gives a historical perspective of Soviet missile activities from 1945 to the early 1980s. May 18, 1980, marked the first test firing by the PRC of an ICBM into a broad ocean area. There was also a concerted effort to equip the 1.4(c)

1.4(c)

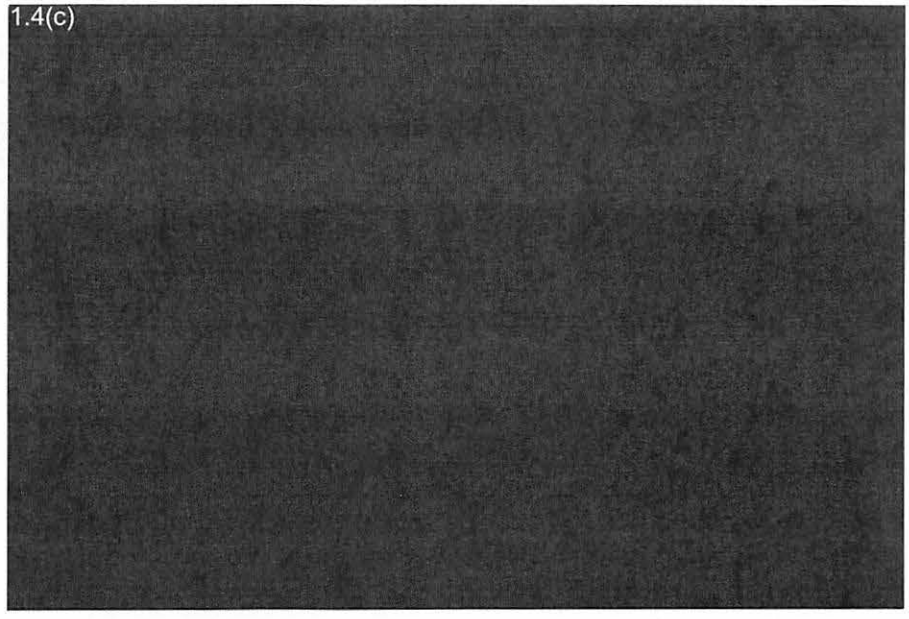
~~(S//SI)~~ Fig. 66. 1.4(c) 1.4(c)

- 1945-1955: "FIRST" GENERATION MISSILES (ORIGINS IN GERMAN MISSILE PROGRAM)
- MID '50s TO MID '60s - "SECOND GENERATION ICBMs
  - EARLIEST AERODYNAMIC SYSTEMS
- 1962 CUBAN MISSILE CRISIS: ORIGIN OF REQUIREMENT FOR "FOURTH" GENERATION ICBMs
- MID 1960s - SS 9, SS 11, SS 13 "THIRD GENERATION ICBM DEPLOYMENT
  - TESTING ADVANCED AERODYNAMIC SYSTEMS
  - LIMITED SLBM DEPLOYMENT
- LATE 60s (VIETNEM WAR): ORIGIN OF NEED FOR ADVANCED TACTICAL AERODYNAMIC & BALLISTIC SYSTEMS
  - FIRST ABM AND IMPROVED SAMs DEPLOYED
- EARLY 1970s: START OF TESTING OF FOURTH GENERATION ICBMs (SS 18, SS 17, SS 19, SS 19)
  - ADVANCED SAM AND ABM TESTING
- 1973 MIDEAST WAR: STIMULUS FOR FUTURE TACTICAL SYSTEMS (SAM, ABM, AAM)
- LATE 1970s - INITIAL DEPLOYMENT OF FOURTH GENERATION ICBMs AND NEW SAMs
  - DEVELOPMENT OF LOOK-DOWN/SHOOT-DOWN AAM
  - INITIAL TESTS OF ADVANCED CRUISE MISSILES
- EARLY 1980s - "SMART" AERODYNAMIC WEAPONS
  - ICBM ACCURACY IMPROVEMENTS (MORV)
  - UNCONVENTIONAL DEFENSIVE SYSTEMS

TOP SECRET ZARF

(TS//TK) Fig. 67. Historical perspective of Soviet missile activities from 1945 to the early 1980s

1.4(c)



sets back to NSA. By the end of the 1980s, DEFSMAC was covering 1.4(c) missile and space launches a year and issuing over 1.4(c) product reports, including over 1.4(c) TACREP reports.[49] Figure 68 shows the "traditional Soviet and PRC missile and space launch and testing locations. Figure 69 shows

1.4(c)

~~(S)~~ Fig. 68. Traditional Soviet and PRC missile launch and testing locations (1980)

1.4(c)

~~(S//TK)~~ Telemetry had a major role in monitoring the SALT/START Accords as it could verify the number of reentry vehicles any given missile was flying.

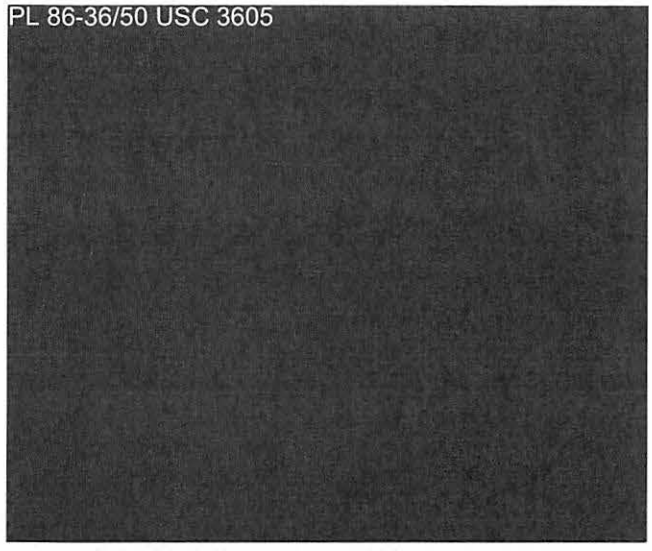
1.4(c)

1.4(c)

(U) DEFSMAC and Other Management Changes

(U) By 1980 the Center that was authorized in 1964 and developed in the late 1960s and 1970s had

come a long way. Many of the people who established the center continued to grow as the Center grew, while some moved on to related activities at NSA or DIA. The "founders" often gathered for DEFSMAC anniversary or other commemorative events. Figure 70 shows some of the key personnel in the development of the Center at such an event.

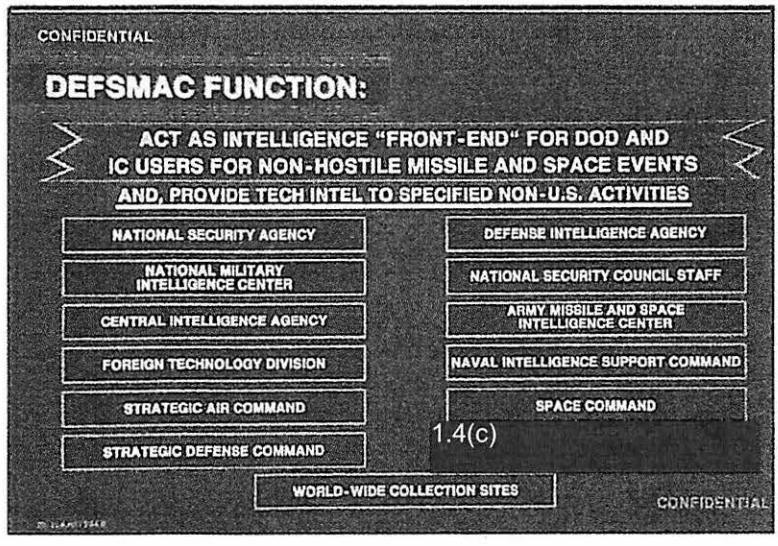


(U//FOUO) Fig. 70. DEFSMAC pioneers

(U) The decade started with Mr. James W. Pryde as director of DEFSMAC, followed from the middle of 1980 to the middle of 1983 by Richard L. Bernard, Roy E. Crippen from 1983 to 1986, and PL 86-36/50 USC from 1986 to 1990.

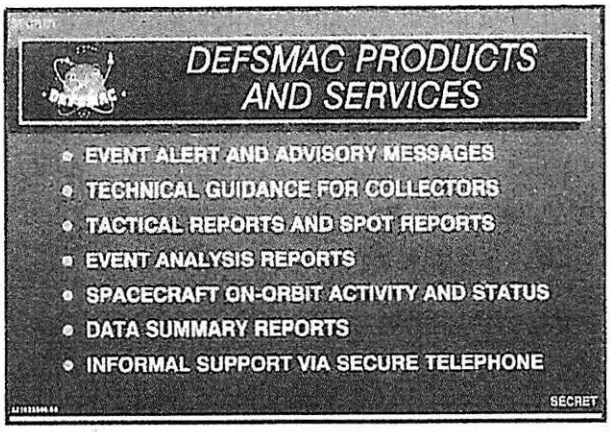
(U//FOUO) By 1980 there were well over PL people working in the Center from NSA and DIA integrated into three "directorates." James Pryde from NSA was the DEFSMAC director. Colonel Joseph Wortman, USAF, from DIA was the deputy director. The Intelligence Directorate, headed by Dominic Colella from DIA, handled the reporting of events once the Current Operations branch did the initial reporting. There were three subdirectorates: Missile Systems (INM), Space Systems (INS), and Spacecraft Operations (INO). The Operations Directorate was headed by R. Steven Smith from NSA. There were three subdirectorates: Operations Resources Management (OPM), Target Development (OPD), and Current Operations (OPW) or "The Watch," where the twenty-four-hour-a-day operations were maintained. The third directorate was the Data Systems Directorate, or SY, headed by PL 86-36/50 USC from NSA. Its three subdirectorates were Programs Development (SYP), Operations Support (SYO), and Multi-Systems Support (SYS). A small staff element completed the organization.[50] An NSA "Manpower Study" in 1983 accounted for 130 people assigned

PL 86-36/50 USC 3605


CONFIDENTIAL
DEFSMAC FUNCTION:
ACT AS INTELLIGENCE "FRONT-END" FOR DOD AND IC USERS FOR NON-HOSTILE MISSILE AND SPACE EVENTS AND, PROVIDE TECH INTEL TO SPECIFIED NON-U.S. ACTIVITIES
NATIONAL SECURITY AGENCY
DEFENSE INTELLIGENCE AGENCY
NATIONAL MILITARY INTELLIGENCE CENTER
NATIONAL SECURITY COUNCIL STAFF
CENTRAL INTELLIGENCE AGENCY
ARMY MISSILE AND SPACE INTELLIGENCE CENTER
FOREIGN TECHNOLOGY DIVISION
NAVAL INTELLIGENCE SUPPORT COMMAND
STRATEGIC AIR COMMAND
SPACE COMMAND
STRATEGIC DEFENSE COMMAND
1.4(c)
WORLD-WIDE COLLECTION SITES
CONFIDENTIAL

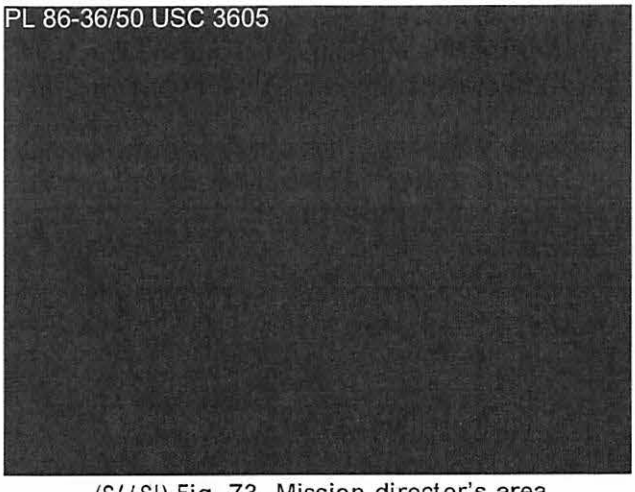
(C) Fig. 71. Significant participants in DEFSMAC operations

(U) The general functions of the center had not significantly changed since 1964. The growth of the intelligence targets had changed and grown. The names of some of the significant organizations participating in DEFSMAC operations, or receiving DEFSMAC "product" reports are shown in figure 71. Some of the DEFSMAC products and services are shown in figure 72.

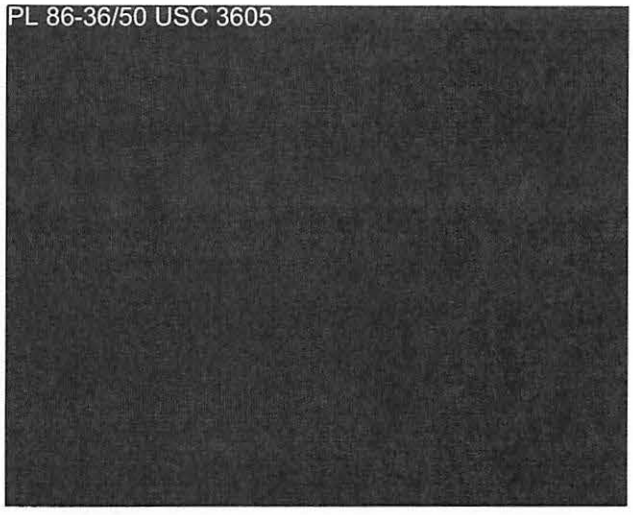


~~(S)~~ Fig. 72. DEFSMAC products and services

(U) The physical "plant" that housed the DEFSMAC operations area, reporting area, computer systems area, and the resources management activities had expanded in bits and pieces over the almost twenty years of the Center's existence. By the early 1980s, it was still functional but needed some major upgrading, such as raised flooring in the computer and reporting areas to better accommodate increased automation. Only further incremental changes needed to be made to the "watch" area and the communications areas. The figures on this page show the areas just prior to the 1983 modernization.

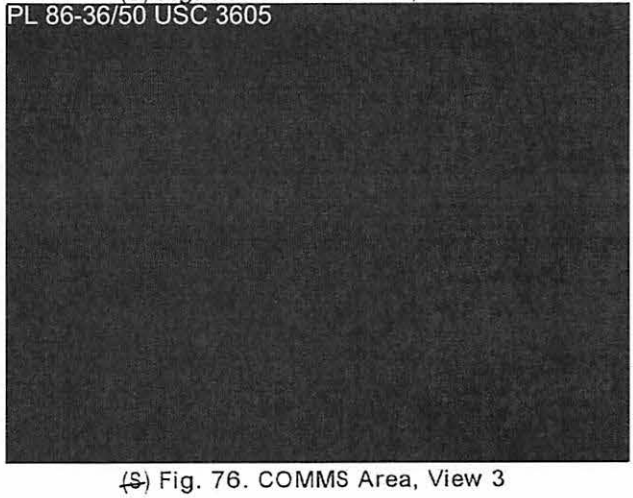


~~(S//SI)~~ Fig. 73. Mission director's area

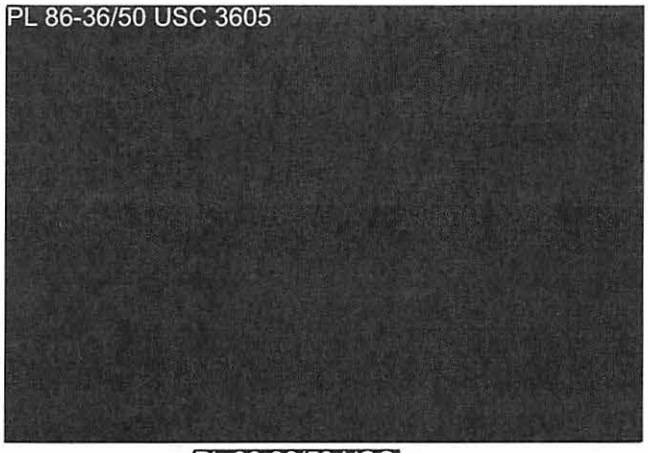


~~(S)~~ Fig. 74. COMMS Area, View 1

~~(S)~~ Fig. 75. COMMS Area, View 2

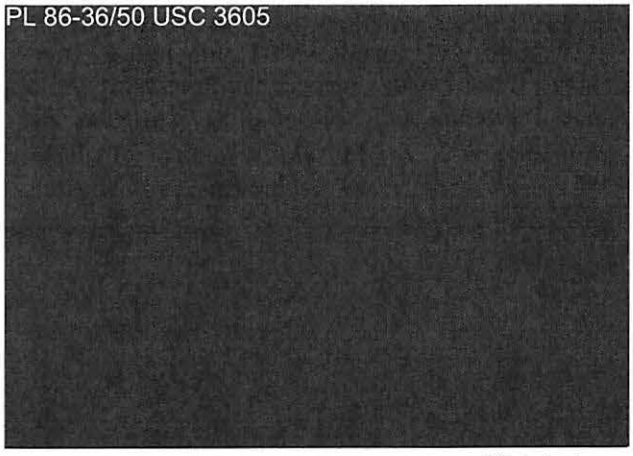


~~(S)~~ Fig. 76. COMMS Area, View 3



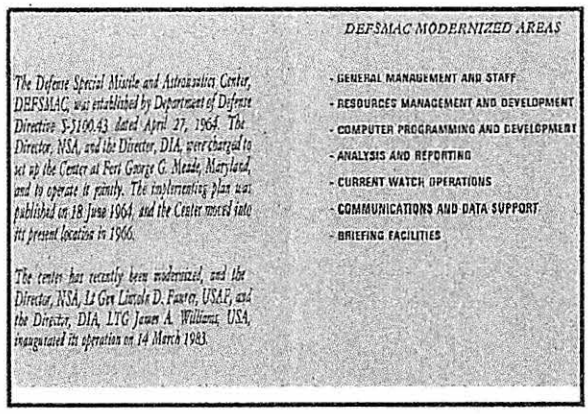
~~(S)~~ Fig. 77. PL 86-36/50 USC operations area

Figure 77 is the PL 86-36/50 USC 3605 operations management area, called the Analysis Control Center (ACC). After the modernization was completed in early 1983, a dedication ceremony was arranged, as shown in figure 78, and was attended by Lieutenant General Lincoln D. Faurer, USAF, director of NSA/CSS, and Lieutenant General James A. Williams, USA, director of DIA. Figure 79 shows the senior managers who officiated at the ribbon cutting ceremony for the modernized center. Figure 80 shows the DEFSMAC director's office after the modernization.

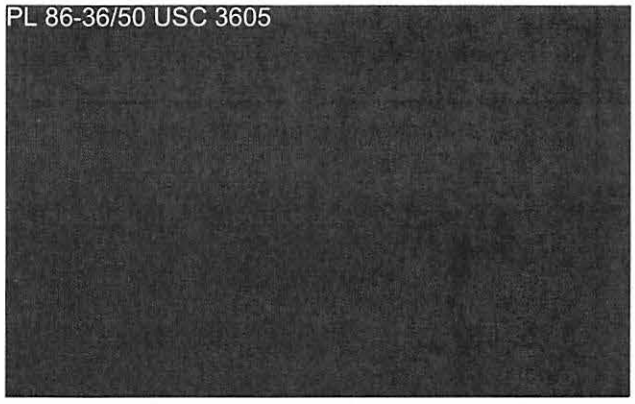


(U) Fig. 79. Senior managers who officiated at the ribbon cutting ceremony for the 1983 modernized center

1.4(c)


DEFSMAC MODERNIZED AREAS
The Defense Special Missile and Astronautics Center, DEFSMAC, was established by Department of Defense Directive S-5100.43 dated April 27, 1964. The Director, NSA, and the Director, DIA, were charged to set up the Center at Fort George G. Meade, Maryland, and to operate it jointly. The implementing plan was published on 18 June 1964, and the Center moved into its present location in 1966.
The center has recently been modernized, and the Director, NSA, Lt Gen Lincoln D. Faurer, USAF, and the Director, DIA, LTG James A. Williams, USA, inaugurated its operation on 14 March 1983.
- GENERAL MANAGEMENT AND STAFF
- RESOURCES MANAGEMENT AND DEVELOPMENT
- COMPUTER PROGRAMMING AND DEVELOPMENT
- ANALYSIS AND REPORTING
- CURRENT WATCH OPERATIONS
- COMMUNICATIONS AND DATA SUPPORT
- BRIEFING FACILITIES

(U) Fig. 78. Dedication ceremony



(U) Fig. 80. Modernized DEFSMAC director's office

1.4(c)

~~(S)~~ By late 1988, DEFSMAC had embarked on an ambitious project to expand and regularize the reporting of selected Soviet 1.4(c) activity that could provide support to U.S operations around the world. The effort was given the acronym OPFIS, Operational FIS. The effort would

require additional field analysis equipment at several of the overhead systems ground stations, at the SPACOL and PL 86-36/50 USC 3605 sites. The plan also required additional automation within NSA and DEFSMAC as well. The effort was strongly supported by the U.S. Space Command. The reports would be patterned after the SIGINT time-sensitive Tactical Reports, or TACREPs. The plan was formally announced to the customer community, and TACREP reporting was initiated in March of 1989.[52] The effort tapered off in the mid-1990s as the threat from Russia was reduced, and the Soviet

1.4(c)

1.4(c)

[redacted]

(C) In late 1982 the NSA "PROD" SIGINT organization made moves to centralize all SIGINT tasking into one organization, designated P5. The W1 Office of Space and Missiles successfully countered the thrust that would have had the W11 Operations Resource Management Branch (OPM) absorbed into the P5 organization. The key argument against the thrust was that missile and space SIGINT tasking needed to remain physically and organizationally close to DEFSMAC for effectiveness, and it remained in W1. (The same thrust was later made in 1992 when the "new W" centralized tasking into W9T7, and this time the thrust succeeded, and the new W9T7 did include missile and space tasking.)[54]

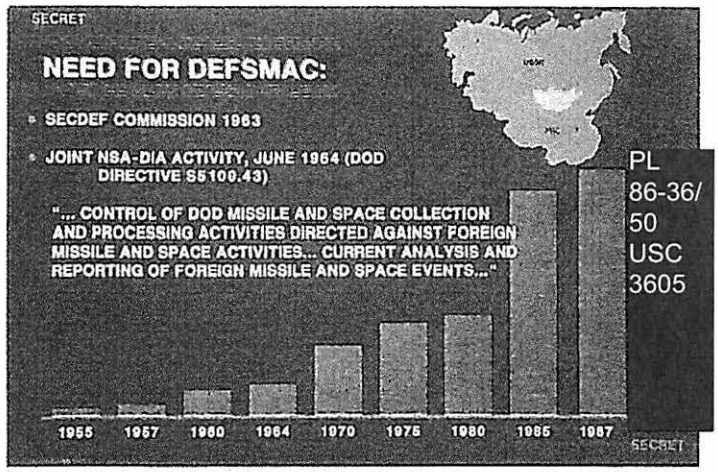
(S) In 1982 Lieutenant General James Abramson, USAF, then Associate Administrator for Space Flight at NASA, visited DEFSMAC. He was shown and told about the U.S. capability against the Soviet space program. 1.4(c)

1.4(c)

[redacted]

(U//FOUO) In 1985 DIA consolidated several functions within DIA to increase the visibility and support to DEFSMAC. What was formerly the Technical Collection Operations Branch, DC-7B, and the Defense Special Missile and Astronautics Center, DC-DS, were combined to form the MASINT and DEFSMAC Division, DC-6.[57]

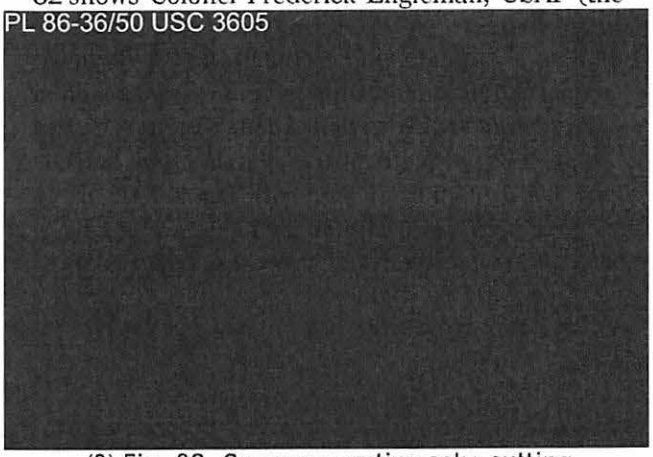
(C) By 1985 the W1 Office of Space and Missiles had fully solidified its mission and its organization had matured. W1 had several technical assistants assigned to the office-level organization, including the TEBAC chairman. W11 was the Collection


SECRET
NEED FOR DEFSMAC:
SECDEF COMMISSION 1963
JOINT NSA-DIA ACTIVITY, JUNE 1964 (DOD DIRECTIVE S5100.43)
"... CONTROL OF DOD MISSILE AND SPACE COLLECTION AND PROCESSING ACTIVITIES DIRECTED AGAINST FOREIGN MISSILE AND SPACE ACTIVITIES... CURRENT ANALYSIS AND REPORTING OF FOREIGN MISSILE AND SPACE EVENTS..."
1955 1957 1960 1964 1970 1975 1980 1985 1987
SECRET
PL 86-36/50 USC 3605

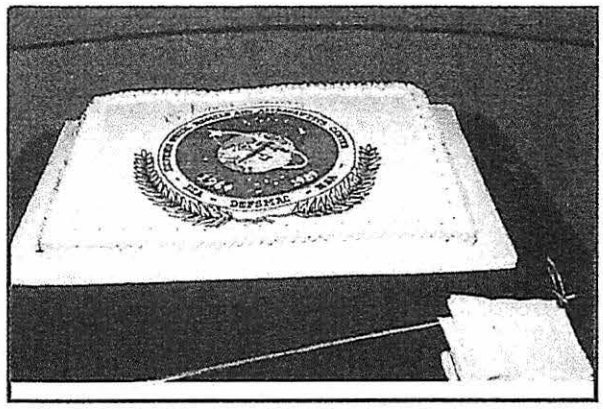
~~(S)~~ Fig. 81. Growth of foreign missile and space activities from 1955 to 1987

Management and Current Reporting Division and formed the NSA nucleus in DEFSMAC. W14 was the Space Division and W15 was the Missiles Division. W16 comprised the Astronautics Research and Computer Systems Division, and W18 handled Special Projects, mostly telemetry analysis equipment. The W19 National Telemetry Processing Center (NTPC) provided the processing of missile and space telemetry signals and coordinated intelligence community participation in such signal processing.[58]

(U) In early 1989 DEFSMAC commemorated its twenty-five continuous years of operations with an anniversary ceremony and summary of its rich history.[59] Figure 81 shows the growth of foreign missile and space activities from 1955 to 1987. Figure 82 shows Colonel Frederick Engleman, USAF (the DEFSMAC deputy director in 1989), former DEFSMAC directors Mr. Charles Tevis, Mr. Gordon Stark, Mr. James Pryde, Mr. Richard Bernard, and the 1989 DEFSMAC director, PL 86-36/50 USC 3605 prior to cutting the commemorative cake, decorated for the occasion with the special modified seal, as shown in figures 83 and figure 84.



~~(S)~~ Fig. 82. Commemorative cake cutting ceremony (1989)



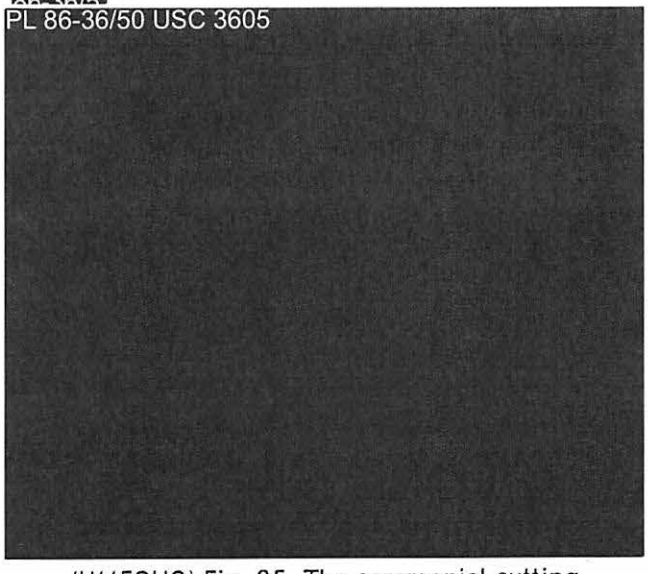
(U) Fig. 83. Cake decoration

(U//FOUO) Fig. 84. Special modification to DEFSMAC seal for commemorative event

~~(TS//TK)~~ By the end of the 1980s, DEFSMAC was operating over 1.4(c) point-to-point communications circuits with real-time "OPSCOMM" capabilities to key worldwide time-sensitive collection

locations and to key recipients of DEFSMAC reports, particularly missile and space launch reports. Secure voice communications and satellite communications links provided by NSA were also available, including the PL 86-36/50 USC 3605 conference capability between DEFSMAC, the 1.4(c) 1.4(c) The SOCOMM network 1.4(c) was also available to DEFSMAC, as well as the GENSER and CRITICOMM systems. The DEFSMAC communications by this time had grown to the point that a new and modern communications "patch panel" was installed in 1989. [60] The original OPSCOMM communications patch panel that had been installed in 1966, much modified, was replaced with a computer-based telecommunication switch. Figure 85 shows the ceremonial cutting of the input cable to the patch panel so it could be removed, presided over by PL 86-36/50 on the left, the telecommunications project supervisor for the effort, and PL director, DEFSMAC.

PL 86-36/50 USC 3605



(U//FOUO) Fig. 85. The ceremonial cutting of the input cable to the patch panel so it could be removed

~~(S)~~ Also by the late 1980s, it was clear that expanding requirements and operational constraints required a new and complete review of the DEFSMAC operations, particularly the communications and computer support for the center. An ambitious plan was created called Part 1, 1990-1992, for the near-term improvements that needed to be made. This plan was issued in mid-1989 and indicated that DEFSMAC needed another forty-eight people authorized, eight from DIA and forty from NSA, and a significant increase in computer automation and communications developments. [61] (Part two of the concept covering Mid-to Long-Term Requirements would be issued in 1991 and will be discussed in the next chapter.)[62] As a follow-on to Part 1 of the DEFSMAC 2000 plan, the director of DEFSMAC met with the director of DIA to personally request the additional eight "billets" from DIA. The reception initially was positive, but soon the end of the Cold War and the overall billet reductions that DIA was soon to receive meant that the DIA billet increase to DEFSMAC never materialized. [63]

~~(S)~~ There was increased DEFSMAC support to USSPACECOM activities, including NORAD, after USSPACECOM was formed in 1985. [64] When the MOA was signed, USSPACECOM was scheduled to put four to five people in DEFSMAC. As USSPACECOM became fully aware of its responsibilities and developed its operating procedures, it became apparent that both DEFSMAC and USSPACECOM would benefit from having exchange officers. NSA/DEFSMAC provided the first exchange officer to USSPACECOM under a Memorandum of Understanding (MOU) reached in May of 1987. That position is still filled by an NSA individual with DEFSMAC experience. [65] (A more comprehensive MOU was to be developed and will be discussed in the next chapter.)

~~(S//SI)~~ Part of the DEFSMAC operations "POI" function got easier in the late 1980s. With the signing of the START agreement in 1988, the Soviet Union notified the U.S. in advance of all ICBM and SLBM test launches. [66] 1.4(c) 1.4(c)

1.4(c)

1.4(c)

(U) Overhead Satellite Collection

1.4(c)

~~(TS//TK)~~ By the early 1980s, several aspects of 1.4(c) collection and processing were being automated at the 1.4(c) 1.4(c) 1.4(c) to provide more timely information as well as reduce the manual work required to produce intelligence information. One of the initial major projects was called PL 86-36/50 USC 3605 An example of the new capability was its processing of the Type 1.4(c)

PL 86-36/50 USC 3605

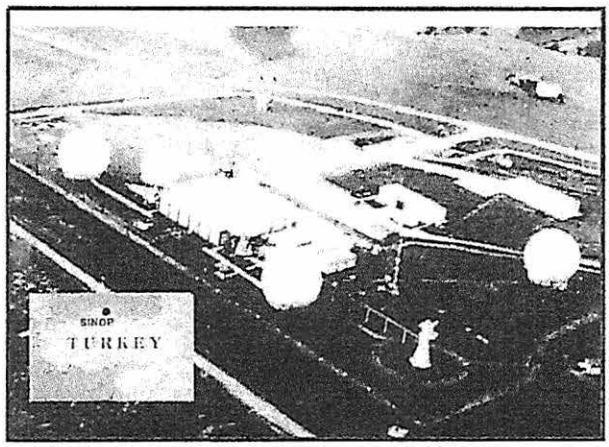
(ASAT) system being tested by the Soviets. The 1.4(c) 1.4(c)

1.4(c)

~~(TS//TK)~~ A second major effort at 1.4(c) during the early 1980s was the PL 86-36/50 project. This 1.4(c)

(U) Ground Collection

~~(S)~~ **HIPPODROME** In the early 1980s, the obsolete VHF antenna system and SHF antenna system in Sinop, Turkey, were replaced by project PL 86-36/50 USC 3605 These are the subsystems in the foreground covered by the two large radomes in figure 88. Figure 89 shows the town of Sinop that is at the "foot" of the hill that houses the 1.4(c) facilities at Sinop.[71] HIPPODROME was the only major missile and space telemetry collection facility still operated by the U.S., in this case the United States Army Security Agency (USASA), later to become the U.S. Army Intelligence and Security Command (INSCOM).



(U//FOUO) Fig. 88. Hippodrome complex

(S) The other major ground locations were all operated by foreign governments as part of bilateral agreements with NSA on TELINT activities. The

1.4(c)

1.4(c)

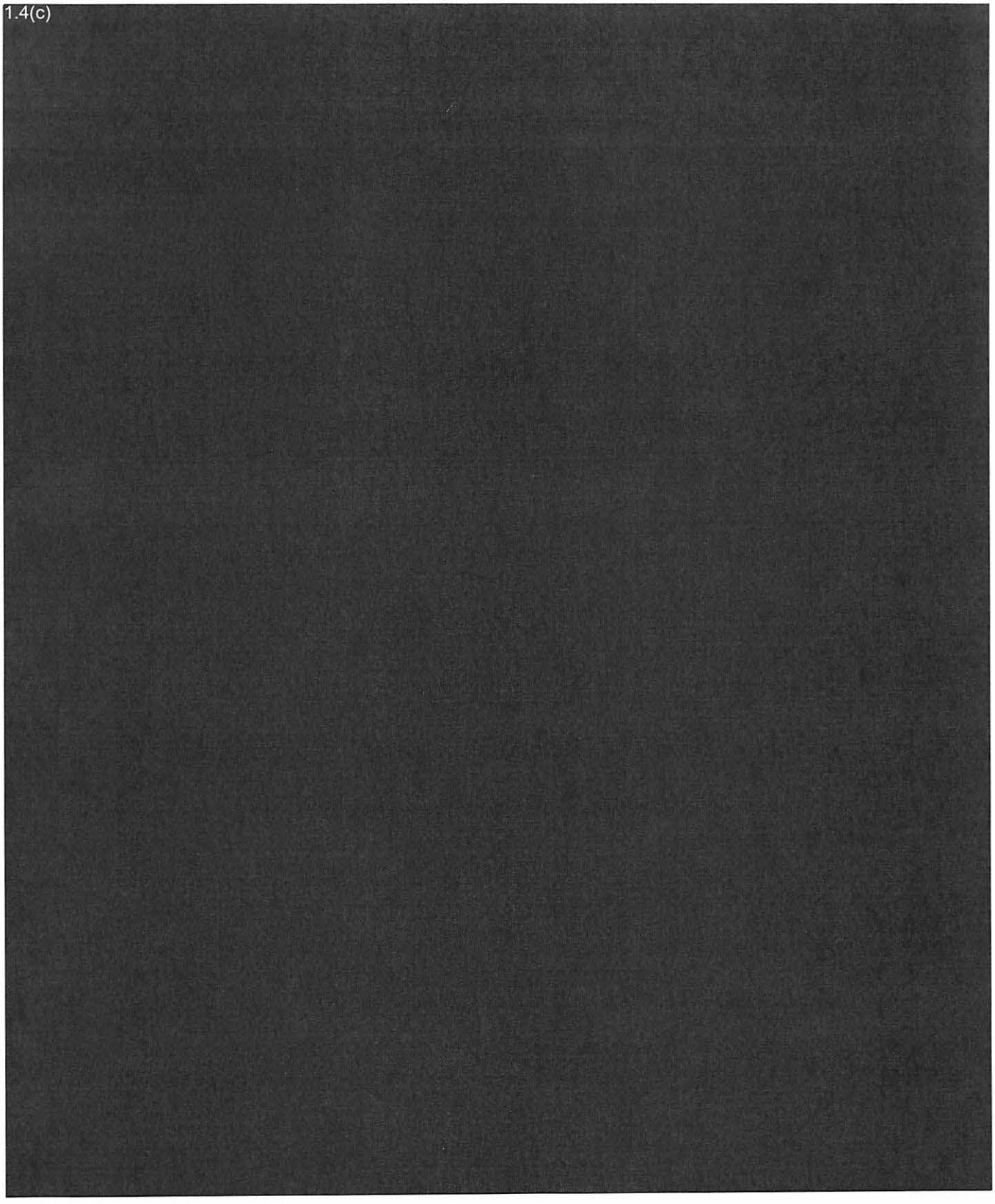
1.4(c) Figure 90 shows photos of these facilities as they appeared in the early 1980s. The addition of the transportable PL 86-36/50 USC 3605 systems, discussed later in this chapter, would add back a substantial U.S. presence to offset any problems that should arise with the host countries operating the TELINT/FIS facilities. The 1.4(c) government also operated some small remote FIS collection facilities under the PL 86-36/50 USC 3605 set of projects, discussed later in this chapter.

PL 86-36/50 USC 3605

1.4(c)

(S) Fig. 90. Major ground FIS collection sites

1.4(c)



1.4(c)

1990s. Figure 96 shows a winter view of the 1.4(c) The outward appearance of the facility has not significantly changed since the installation in 1967, although many equipment improvements had been made to the antennas and to the equipment inside the building.

~~(S)~~ The 1.4(c) have expanded to three different locations and figure 97 shows a summer photo of the 1.4(c) site, again high in the mountains 1.4(c) 1.4(c) Figure 98 shows the equipment configuration

1.4(c)

satellite coverage from 1.4(c)

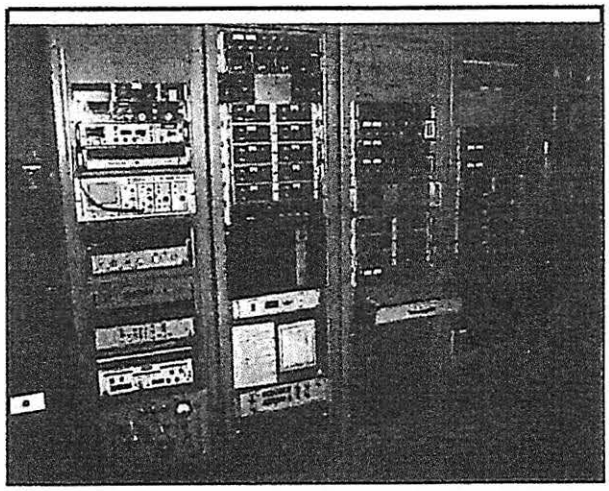
1.4(c)

for the site, mostly fixed tuned receivers that were preset to 1.4(c) telemetry frequencies.

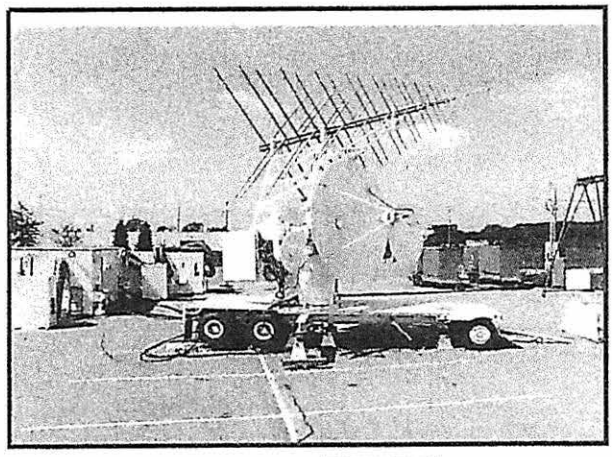
~~(S)~~ PL 86-36/50, a TELINT signal search system with an extended frequency range, was built and operated for a short time 1.4(c) to look for 1.4(c) that might not be heard at other ground sites.

~~(S//SI)~~ PL 86-36/50 USC In the late 1970s it became apparent that there needed to be "tactical" collection and reporting of events to the U.S. Space Command. A USAF, primarily Electronic Security Command (ESC) – the successor to the Air Force Security Service (AFSS) – and NSA joint effort was started under the Tactical Cryptologic Program (TCP) to establish a set of QRC transportable telemetry collection systems that could also serve as "gap fillers" for the conventional major ground collection sites. The overall set of systems was 1.4(c)

1.4(c) The sites reported some results directly to AFSPACECOM as an input to the Satellite Attack Warning System (SAWS) and also collected telemetry to support NSA analytic efforts. NSA assisted ESC in defining the systems capabilities and set up processing and reporting requirements and procedures for the telemetry collection and field analysis. PL 86-36/50 USC mission control was exercised by the Analysis and Control Center (ACC) located adjacent to DEFSMAC.[73] The PL 86-36/50 USC 1.4(c)



~~(S)~~ Fig. 98. PL 86-36/50 USC 3605 equipment configuration



~~(C)~~ Fig. 99. PL 86-36/50

1.4(c)

1.4(c)

(U) Airborne Collection

1.4(c)

~~(S)~~ **OAMP** The Optical Aircraft Measurement Program (OAMP) came to fruition in 1988. 1.4(c) was sponsored by the U.S. Army Strategic Defense Command (USASDC) and operated by the U.S. Air Force Strategic Air Command (SAC), usually flying from Shemya Island to cover the Kamchatka Russian ICBM impact area.[74] (With the reduction in priority and scope of the Russian ICBM program in the late 1990s, the PL 86-36/50 USC 3605 1.4(c) was scheduled to be converted to a PL 86-36/50 USC 3605 configured aircraft.)

1.4(c)

1.4(c)

(U) Deep Space Collection

1.4(c) With the closure of the USASA- and then NSA-operated STONEHOUSE facility in Asmara, Ethiopia, in the 1970s, NSA was dependent on facilities operated by other countries where collection from Europe or Asia was needed. The previous chapter briefly discussed "The Missing Link," a reference to a Soviet command link that was postulated to exist to command their planetary space probes. 1.4(c)

1.4(c) [redacted]

~~(S)~~ The 1.4(c) [redacted] aircraft continued to be sponsored by SAC and operated by Detachment 1 of the 6th Strategic Wing out of Eielson AFB, Alaska. 1.4(c) [redacted]

1.4(c) [redacted]

1.4(c) [redacted]

PL 86-36/50 USC 3605 [redacted]

1.4(c)

1.4(c)

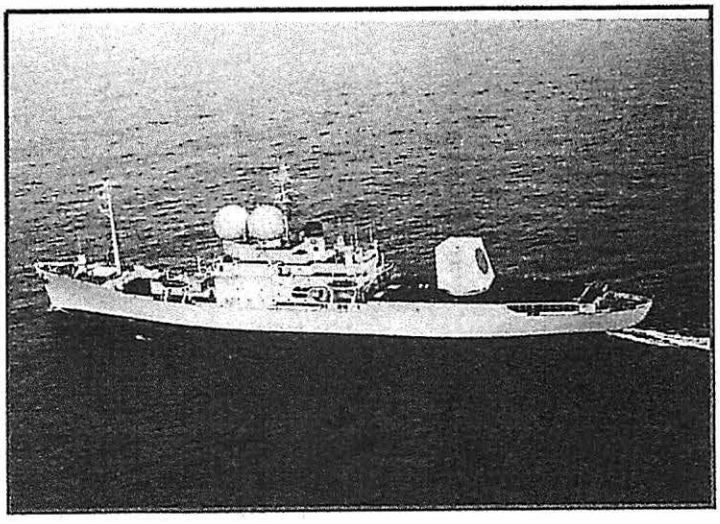
(U) Sea-based Efforts

~~(S)~~ **COBRA JUDY** started operations in the early 1980s as a major seaborne 1.4(c) platform in the Pacific operations area. 1.4(c)

1.4(c)

1.4(c)

1.4(c)



(U//FOUO Fig. 107. COBRA JUDY

1.4(c) [redacted]

1.4(c) [redacted] NSA Office of Space and Missiles (W1), DEFSMAC, and U.K. collaboration continued in the 1980s on many fronts. The 1.4(c) [redacted]

1.4(c) [redacted] GCHQ, now a participant in the ground site operations at 1.4(c) [redacted] 1.4(c) [redacted] at times assisted in the telemetry analysis at NSA or at the site. During the 1.4(c) [redacted]

(U) More NSA and GCHQ Collaboration

1.4(c) [redacted] GCHQ had always been the point of contact for NSA in arranging for coverage 1.4(c) [redacted] scientists. After the closure of STONEHOUSE, 1.4(c) [redacted] was critical in covering 1.4(c) [redacted] 1.4(c) [redacted] approaching their mission targets.[78] In the early 1980s, NSA and GCHQ dialog continued on the use of 1.4(c) [redacted] facilities for 1.4(c) [redacted] and an equipment upgrade was completed in 1984.

1.4(c) [redacted] Since the late 1970s, 1.4(c) [redacted]

1.4(c) [redacted]

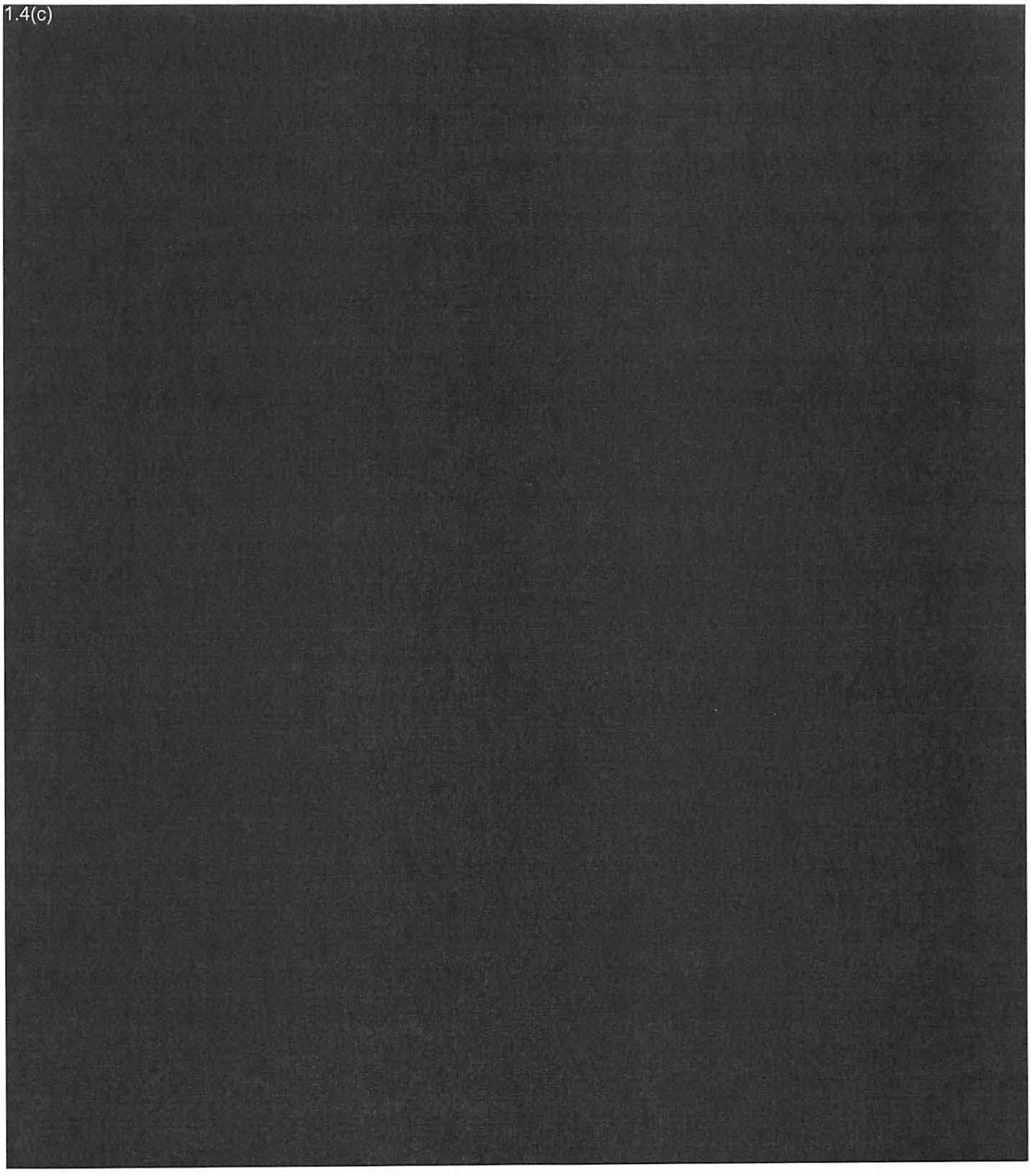
1.4(c) [redacted]

GCHQ is also a full participant, along with Canada, in several working groups (including TEBAC) on missile and space topics and has hosted several annual meetings for the groups.[80] Figure 109 shows the 1980s location of 1.4(c) [redacted] facilities that contributed to signals collection on foreign missile and space targets.

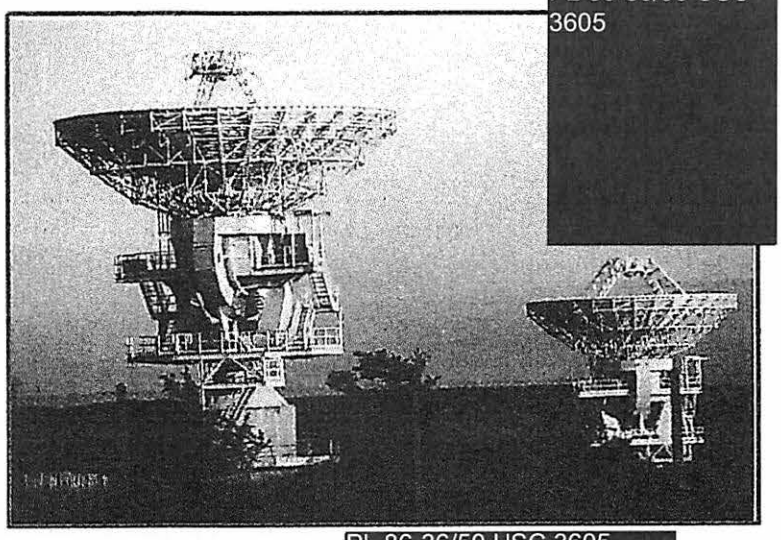
(U) PL 86-36/50 USC 3605 [redacted]

~~(S)~~ The 1980s saw the rapid development of Intelsat, Soviet, and other countries satellite communications systems. The Soviet Union alone had eight types of communications satellites, many with multiple vehicles in each class. Several PL 86-36/50 USC [redacted] site locations and systems were added to those developed and installed in the

1.4(c)



1.4(c)



(U//FOUO) Fig. 111 PL 86-36/50 USC 3605

(U//FOUO) Fig. 112 PL 86-36/50
(radome at the bottom of the photograph)

1.4(c)

1.4(c) The JCS normally responds, and 1.4(c) is often chosen as the focal point for the operation. 1.4(c)

1.4(c)

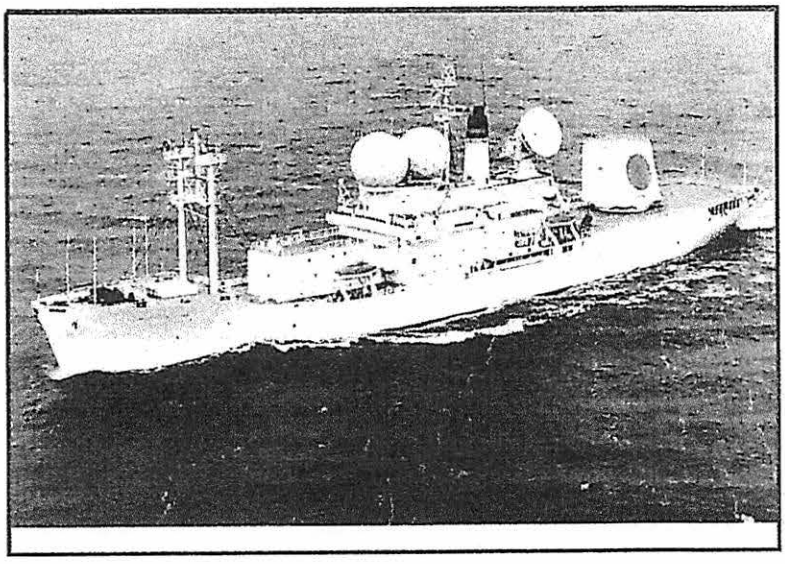
1.4(c) When it is available and can reach the area in time, the OBIS (COBRA JUDY) is deployed. Figure 113, shows the OBIS platform with the COBRA JUDY phased-array radar at the right of the photo and the

(U) 1.4(c)

1.4(c) antennas in the 1.4(c)

1.4(c) The USAF deploys one of the

1.4(c) 1.4(c) aircraft and DEESMAC usually sends an analyst to 1.4(c) to act as a focal point for information. Additional secure communications circuits are established to 1.4(c) and to the various air and sea platforms



(U//FOUO) Fig. 113. COBRA JUDY

1.4(c)

1.4(c)

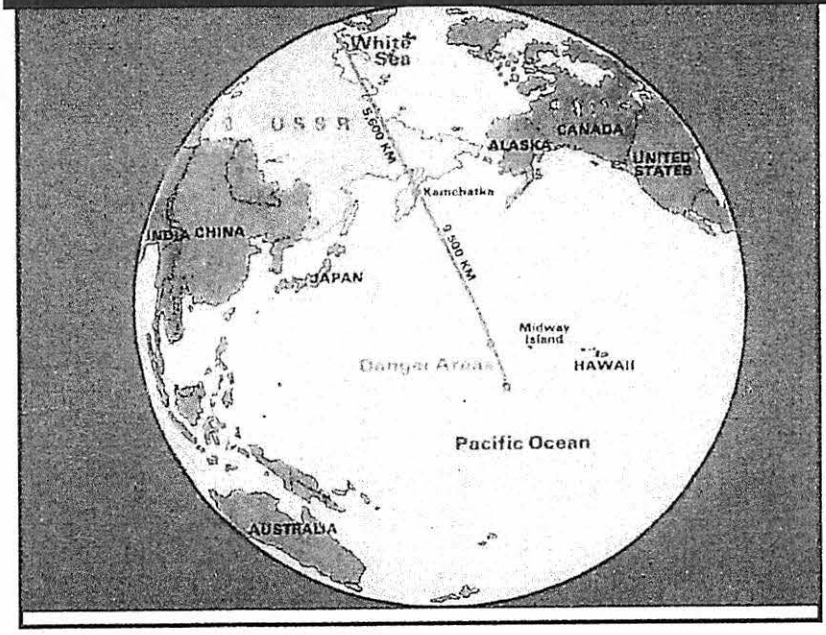
that are expected to participate. Figure 114 shows a trajectory of an extended range test firing of an SLBM, and figure 115 shows a

1.4(c)

1.4(c)

When the actual launch occurs, DEFSMAC alerts the assets in the area via satellite communications

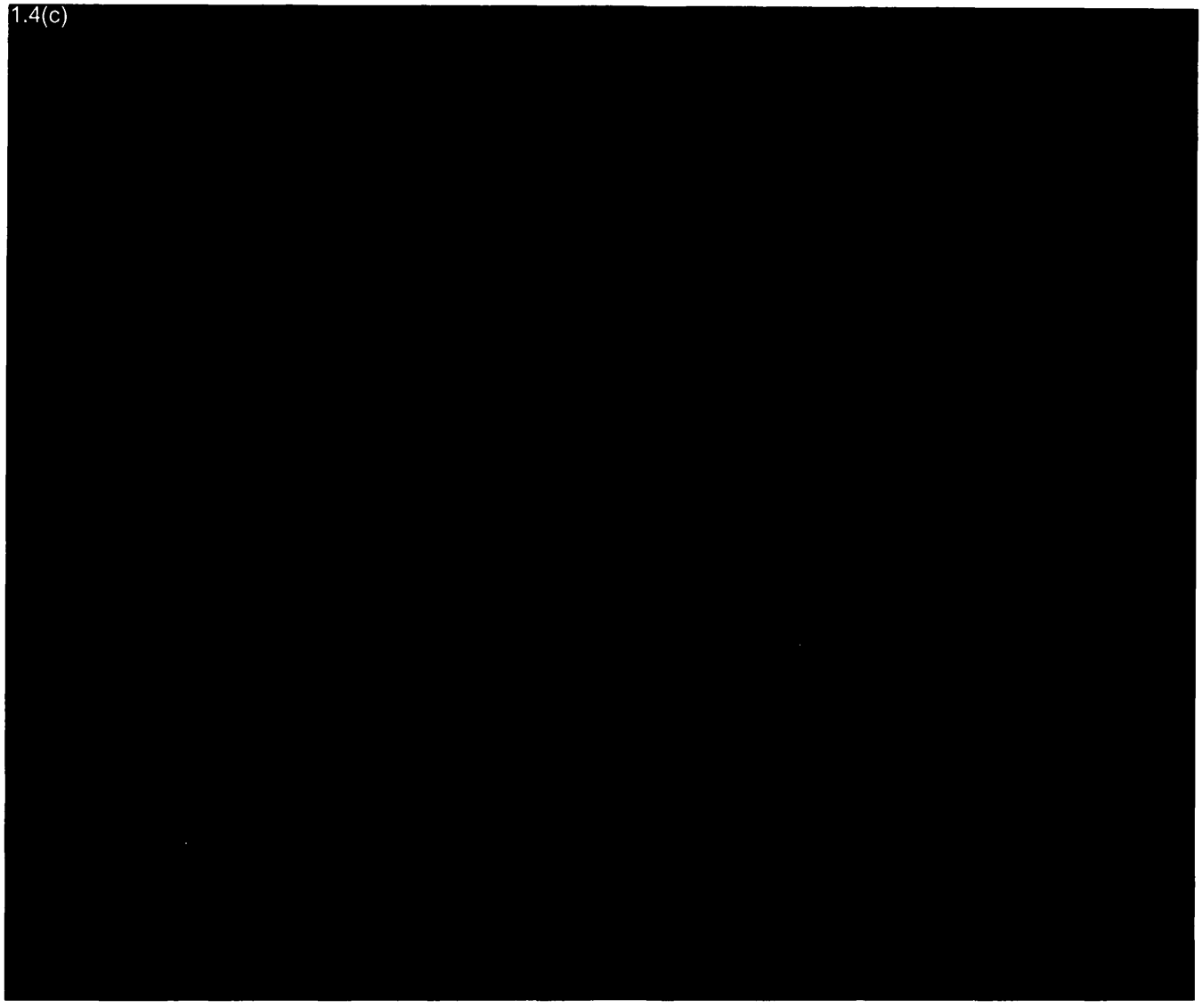
1.4(c)



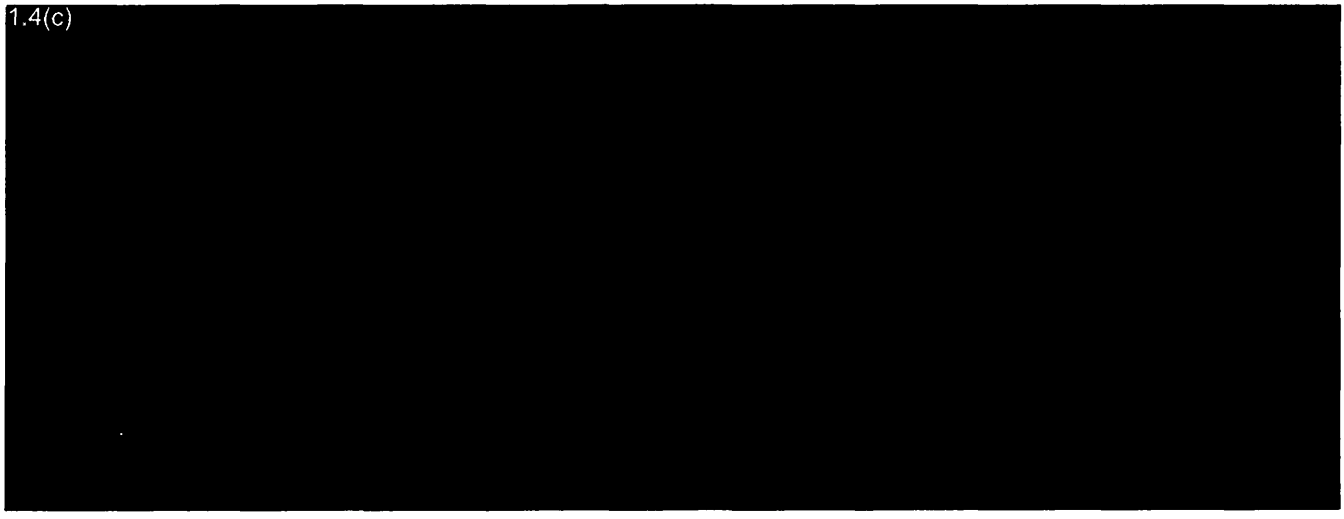
~~(S)~~ Fig.114. A trajectory of an extended range test firing of an SLBM

~~(S)~~ Fig. 115. A typical array and positioning of the 1.4(c) assets –1980

1.4(c)



1.4(c)



1.4(c)

(U) Table 3-1 shows a typical set of assets 1.4(c) 1.4(c) in the mid-1980s.[82]

some cases existing facilities needed to be augmented to cope with some of the newer telemetry transmissions from Soviet and PRC launches.

(U) PL 86-36/50 USC 3605

~~(S)~~ NSA often implemented PL 86-36/50 USC 3605 efforts in conjunction 1.4(c)

1.4(c)

1.4(c) These were usually against very important

1.4(c)

PL 86-36/50 USC 3605

1.4(c)

Year	Project Name	Location	Target
1982	1.4(c)		
1984			
1985			
1987			
1988			
1988			
1988			
1989			

~~(S)~~ Table 3-2 PL 86-36/50 USC 3605 efforts in the 1980s

1.4(c)

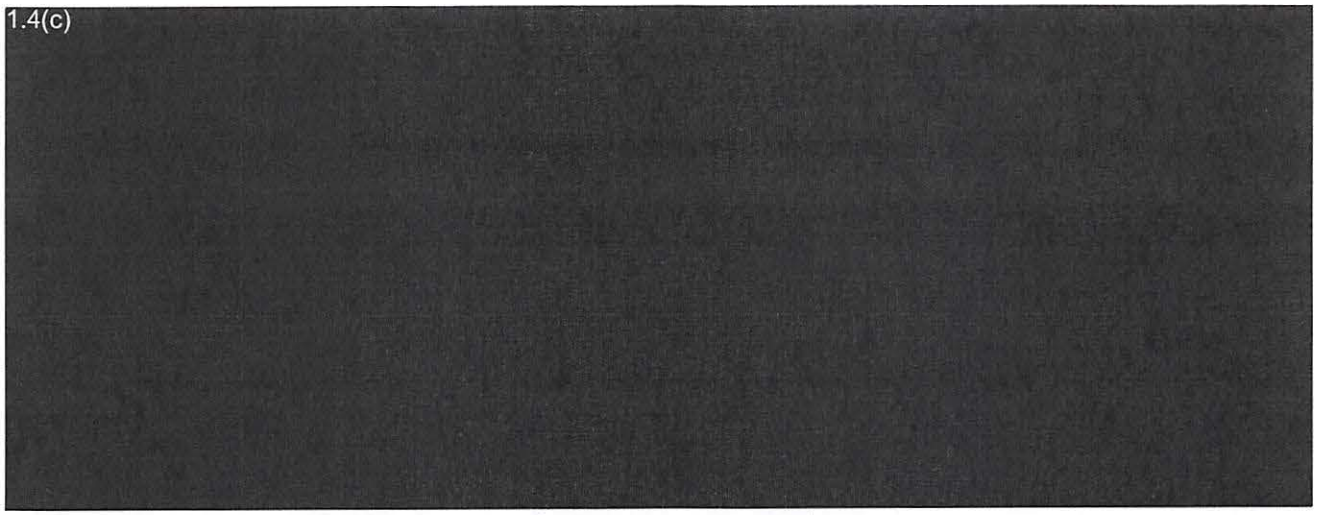
~~(TS//TK)~~ Fig. 121. DEFSMAC primary SIGINT assets

(U) Collection Summary

~~(TS//TK)~~ The collection assets available to DEFSMAC for FIS collection in the 1970s and 1980s PL 86-36/50 PL 86-36/50 USC 3605

~~(C)~~ By the early 1980s, the wide array of ground field collection sites that had been developed during the late 1960s and the 1970s was requiring

~~(TS//TK)~~ Fig. 122. DEFSMAC primary SIGINT assets planned for the later part of the 1980s and 1990s (not all of which materialized)

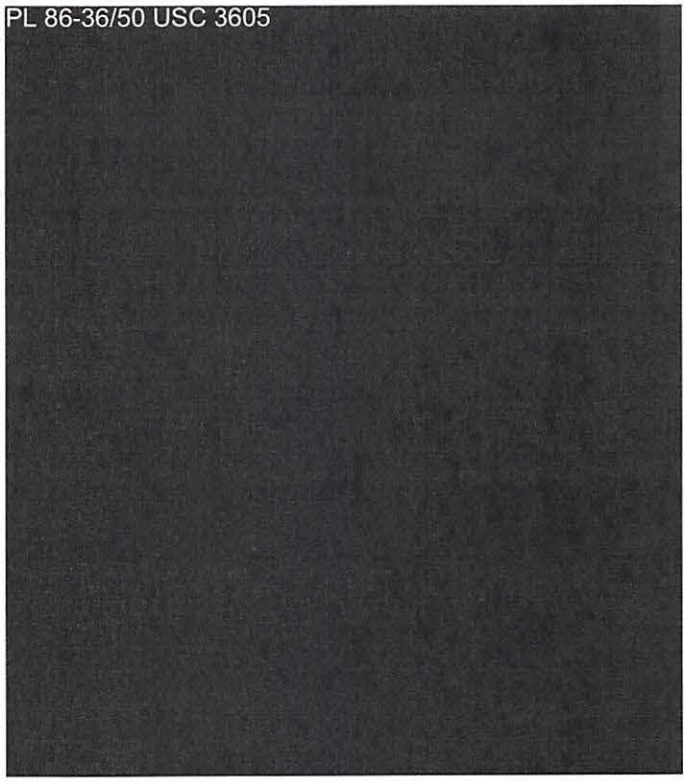


(TS//TK//NF) Fig. 123 and 124. Similar portrayals for the non-SIGINT assets targeted against foreign missile and space intelligence targets.

1.4(c)

more and more maintenance efforts.1.4(c) NSA had used "EDL," which by this time had become GTE Systems – Sylvania Systems Group – Western Division, to design, build and install most of the larger facilities. These included PL 86-36/50 ANDERS,1.4(c) 1.4(c) 1.4(c) and several other systems or subsystems at other locations.1.4(c) NSA jointly funded an engineering consulting, repair, training, fly-away technical support, spare parts "depot" at Sylvania. NSA managed the contract1.4(c) [83] In the late 1980s the original PL 86-36/50 project name was changed to PL 86-36/50 USC and that contract remains in effect today, some twenty years later. The individual depicted on the PL 86-36/50 ogo is PL 86-36/50 who started his career while in the U.S. Army Security Agency at the 1.4(c) site, and then became an NSA civilian and for many years was responsible for implementing many TELINT systems modifications and expansions. He later joined GTE, now part of General Dynamics and is responsible for supervising the management of the PL 86-36/50 USC contract for General Dynamics. Mr. PL is another example of someone who found the TELINT/FIS activities a challenging area in which to spend over thirty years of his career.

PL 86-36/50 USC 3605

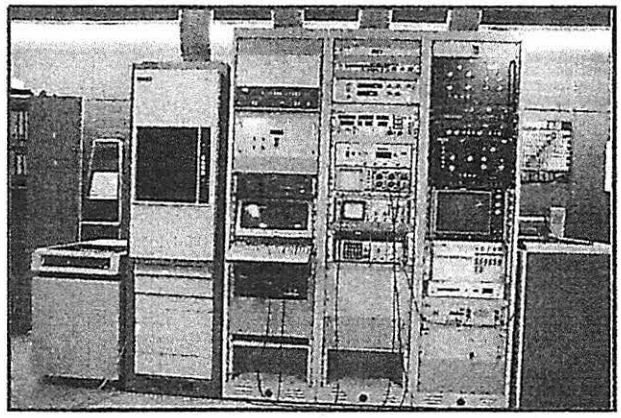


(U) FIS Signal Processing

(S) PL 86-36/50 USC 3605 A major effort was initiated in the early 1980s to standardize TELINT collection data formats into the FIS Data Interchange (FISDI) format and through electrical communications

send the data to NSA as data files rather than the expensive, bulky and costly couriering of analog magnetic tapes. At the time the cost of leasing (or owning) secure satellite or cable communication channels made the concept not feasible, and it was only partially implemented.

~~(S)~~ Several equipment configurations developed for field site equipment, mostly computer based by this time, were needed to meet the increases in TELINT [redacted] a field processor, was installed at [redacted] in 1983. [redacted] a processor for PPM signals, was provided to JAEGER.



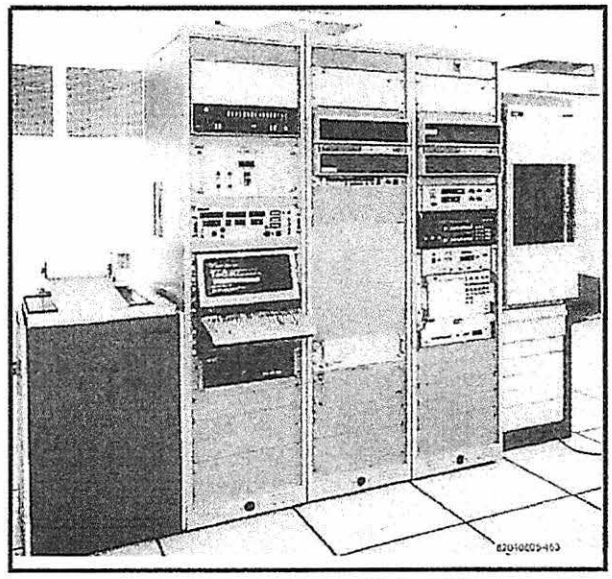
~~(S)~~ Fig. 126. The [redacted] equipment at the [redacted] site

~~(S)~~ [redacted] a computer-based processor for [redacted] and other [redacted] signals, was scheduled for HIPPODROME in the mid-1980s to [redacted] Built by HRB, installation was delayed several years because of international policy problems between Turkey and the U.S. It cost over $6M and was finally installed in late 1989. The system, fully occupying seven equipment racks, could process, [redacted]

[redacted]

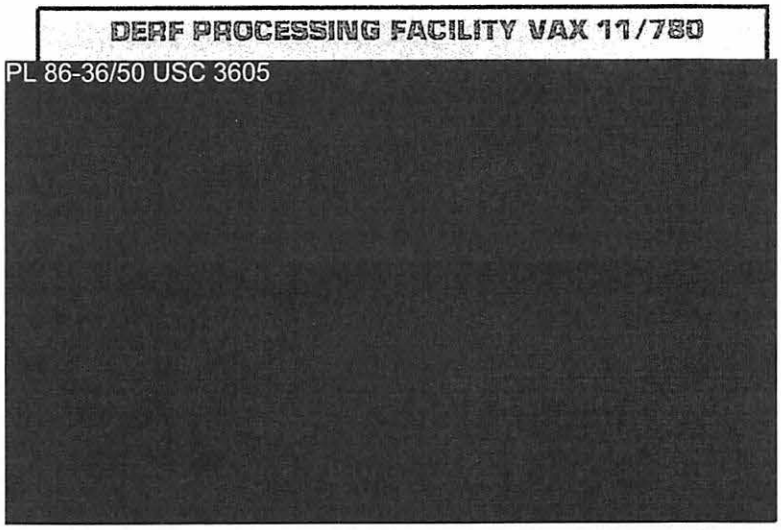
[redacted] purchased a major field telemetry processor called [redacted] and installed it at [redacted] in 1981 for [redacted] processing. (See figure 126.)

~~(S)~~ The [redacted] program developed the [redacted] Analysis System [redacted] field processing system and installed it at all of the [redacted] sites. [redacted] (deployed in 1982) was one of the first field systems to prepare computer FISDI tape outputs, described below.[84] (See figure 127.)



~~(S)~~ Fig. 127. The [redacted] signal processing subsystem

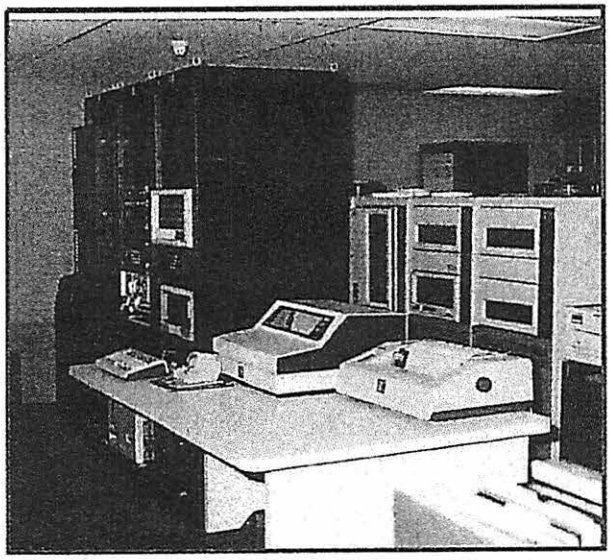
~~(TS//TK)~~ Initially used for [redacted] processing in the mid-1970s, the DERF focus changed [redacted] in the early 1980s. By the late 1980s DERF was targeting against [redacted]



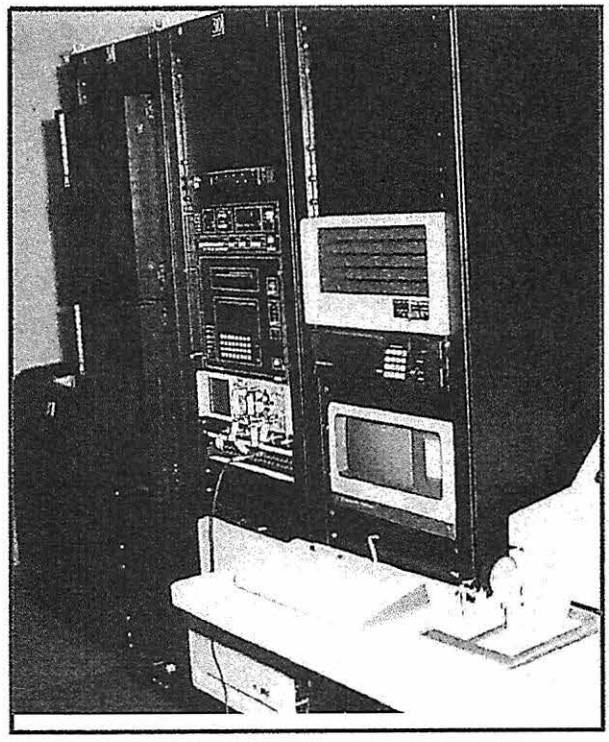
(U) Fig.128. DERF facility in 1982, using a VAX 11/780 as the primary digital data manipulator

was developed by FWS/EMR primarily to automatically produce TARs and FISDI data files. The systems can also produce data for EAR reports on unknown signal modes. Additional systems were built and installed at PL 86-36/50 USC 3605 and at NSA in the NTPC. At the NSA NTPC, the DELF was used in conjunction with PL 86-36/50 USC 3605 to produce TAR reports and to develop software modifications for the field sites. The DELF equipment at the field sites analyzed telemetry from 1.4(c) and first identified the use of 1.4(c) 1.4(c) 1.4(c)

~~(S)~~ In 1984 the DELF telemetry signal processor was built and deployed to the 1.4(c) facility in 1.4(c) This processor, contained in six racks of equipment, provided an almost all-digital and very flexible signal processor for telemetry 1.4(c) signals expected from the Soviet 1.4(c) systems at that time. (See figures 129 and 130.) The equipment

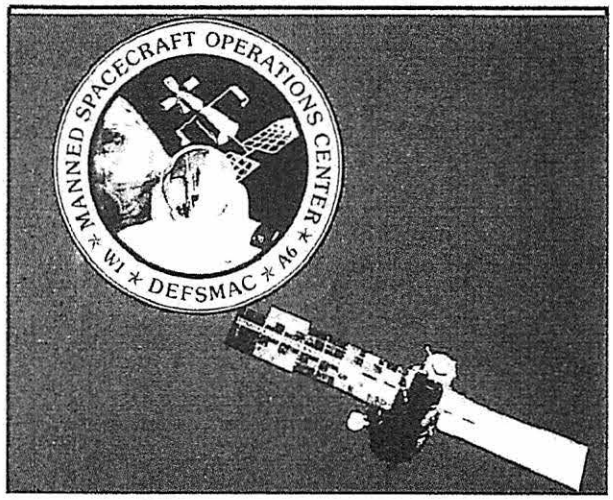


(U//FOUO) Fig. 129. DELF equipment system, including the storage disk drives



(U//FOUO) Fig. 130. DELF equipment operating console

1.4(c)



(U//FOUO) Fig. 131. MSOC logo

(S) Soviet Manned Voice Processing

~~(S)~~ The MSOC (Manned Space Operation Center) was established in DEFSMAC in 1981 for more timely reporting of Soviet manned space activity for both DoD and NASA requirements. [87] High interest in Soviet manned flight started in 1971.

1.4(c)

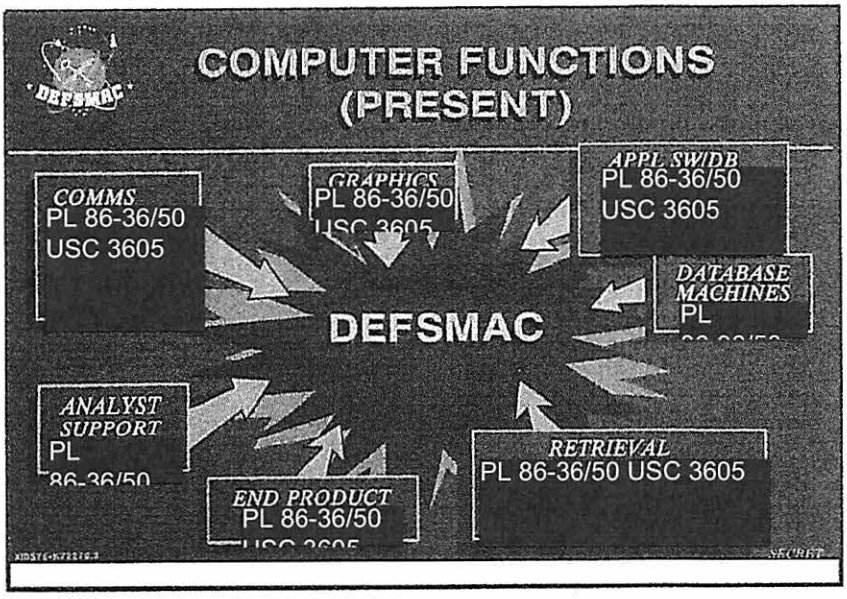
1.4(c)

(U) DEFSMAC Computer Status

~~(C)~~ A number of major computer processing upgrades were in progress or completed in the 1980s for DEFSMAC. The continued application of experienced NSA and DIA programmers fully integrated into DEFSMAC optimized this process

1.4(c)

~~(TS//SI)~~ Fig. 132. January through June 1987 activities on MIR

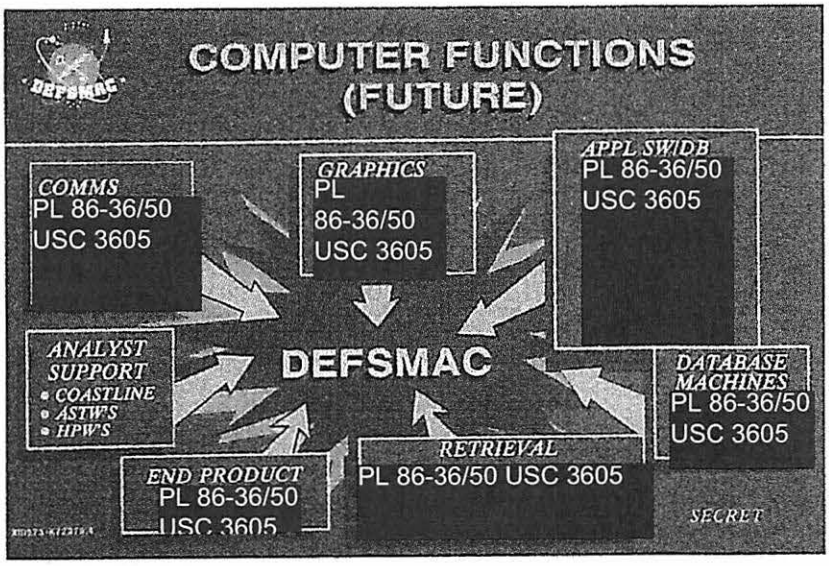


~~(S)~~ Fig. 133. The major computer functions and projects in DEFSMAC in the mid-1980s

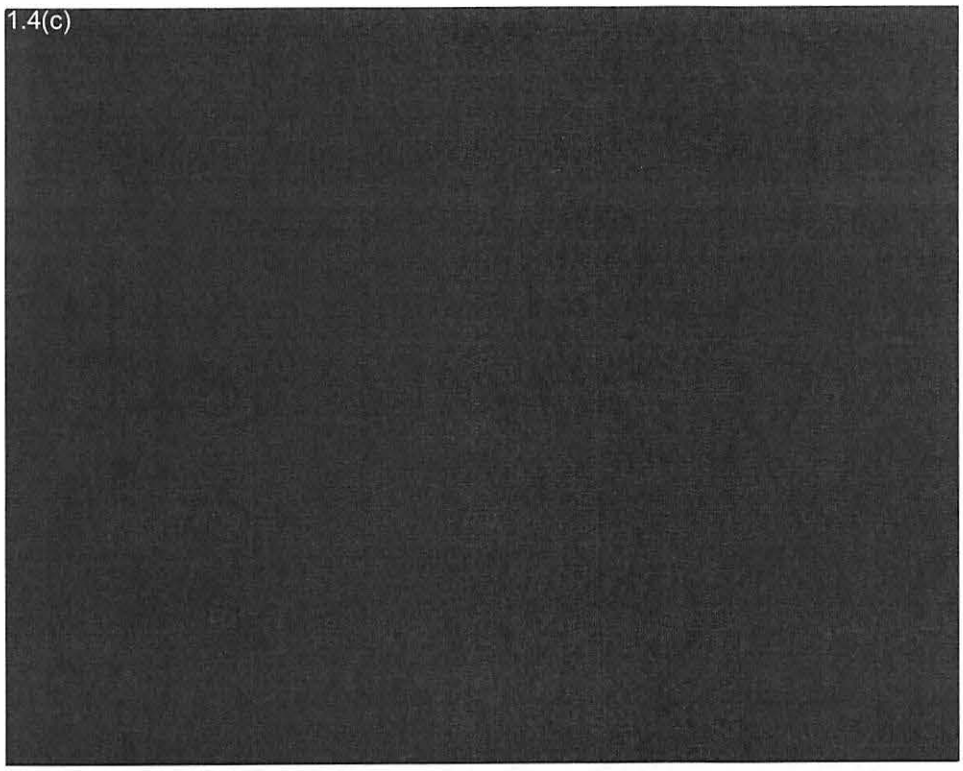
and improved mission performance.[88] Figure 133 shows the major "Present" computer functions and projects in DEFSMAC in the mid-1980s, and figure 134 shows the "Future" efforts that were planned. Appendix C provides a table that lists most of the major projects and systems developed or used to support DEFSMAC from the 1960s through the 1990s.

(U) Important Analytic Results

~~(S)~~ In 1988 the Soviets tested their space shuttle "Buran" with an unmanned launch from the Baykonur cosmodrome (called Tyuratam in U.S. classified reporting) with a recovery of the spacecraft on a runway at the Baykonur facility. The Soviets were so proud of this event that they provided extensive newspaper and television reporting, and the FBIS was able to provide an almost complete description of the event from these



~~(S)~~ Fig. 134. "Future" efforts planned for the late 1980s

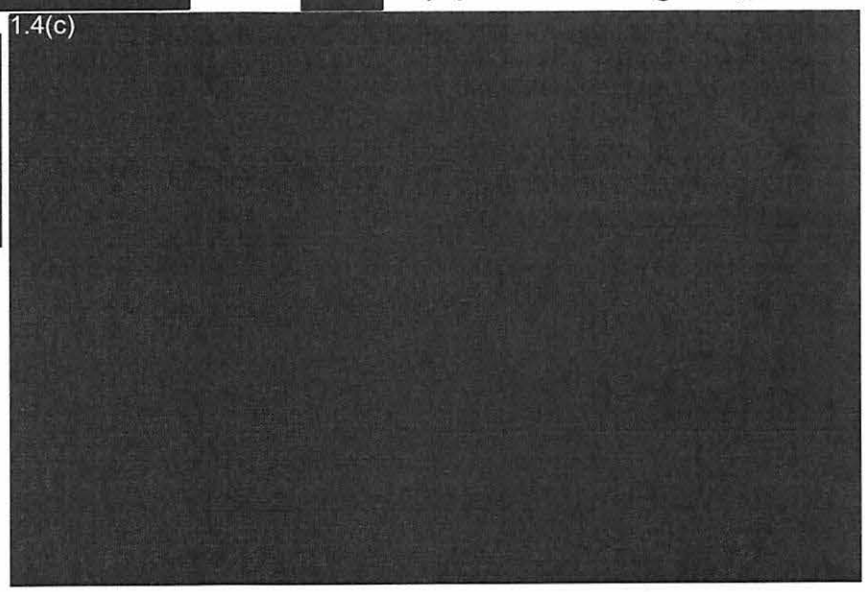


~~(S)~~ Fig. 135, Soviet Space Shuttle, 1.4(c)

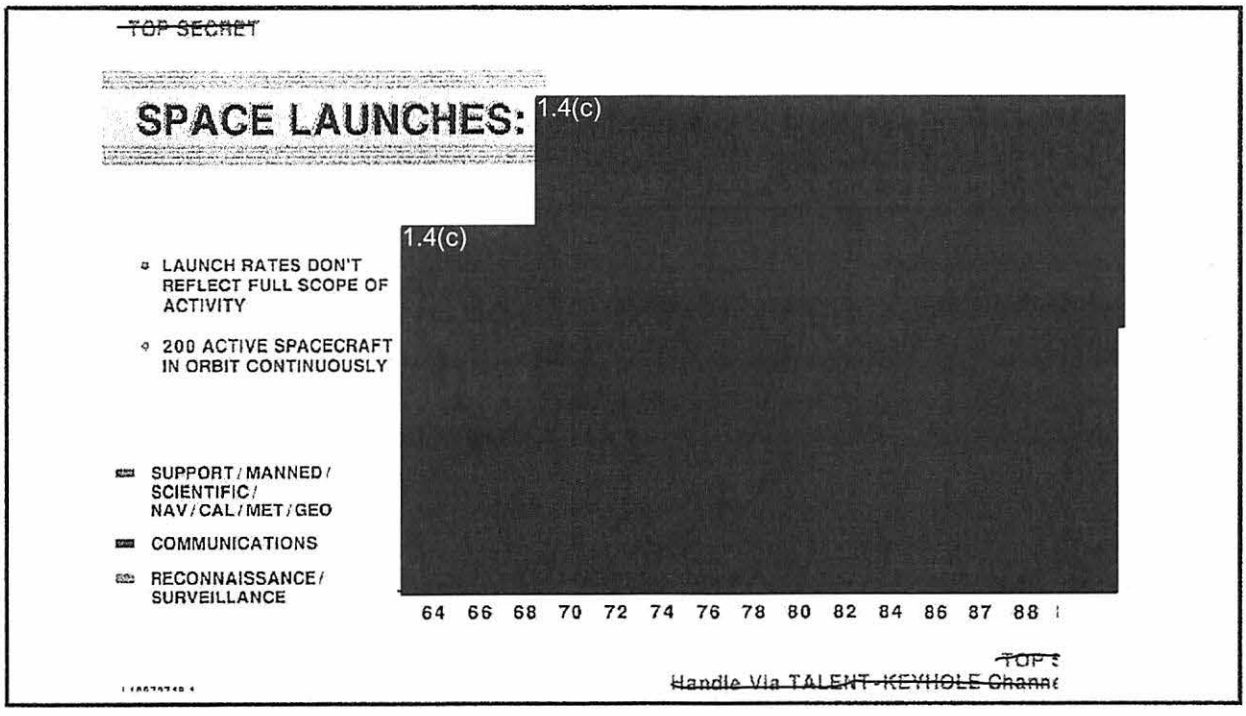
sources.[89] Figure 135 shows the space shuttle 1.4(c)

1.4(c)

participants in the exchange of the FIS material and intelligence product that was derived from the material. In the early 1980s, the DCI formally approved the release of such pertinent material and participants in the exchange of FIS material and intelligence product that was derived from the material In the early 1980s, the DCI formally approved the release of such pertinent material, and 1.4(c) became more actively involved in FIS activities.[90] Figure 136 shows the growth of foreign missile launches detected by all of the sources available to DEFSMAC; the total reached almost 1.4(c) in 1989. As shown in figure 137, the



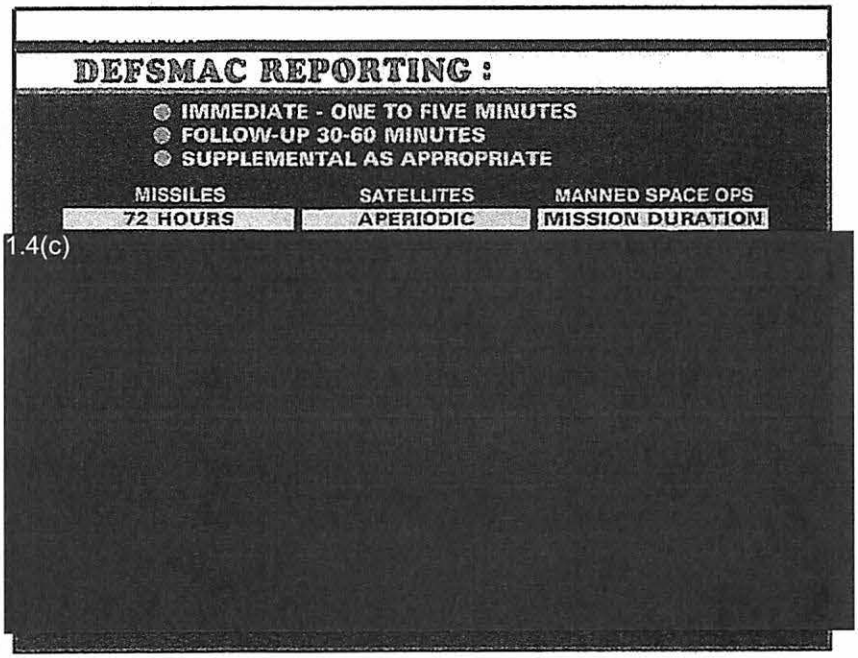
~~(TS//TK)~~ Fig.136. Growth of foreign missile launches.


~~TOP SECRET~~
SPACE LAUNCHES:
1.4(c)
1.4(c)
LAUNCH RATES DON'T REFLECT FULL SCOPE OF ACTIVITY
200 ACTIVE SPACECRAFT IN ORBIT CONTINUOUSLY
SUPPORT / MANNED / SCIENTIFIC / NAV / CAL / MET / GEO
COMMUNICATIONS
RECONNAISSANCE / SURVEILLANCE
64 66 68 70 72 74 76 78 80 82 84 86 87 88
~~TOP~~
~~Handle Via TALENT-KEYHOLE Channel~~

~~(TS//TK)~~ Fig.137. Foreign space launches detected by all of the sources available to DEFSMAC

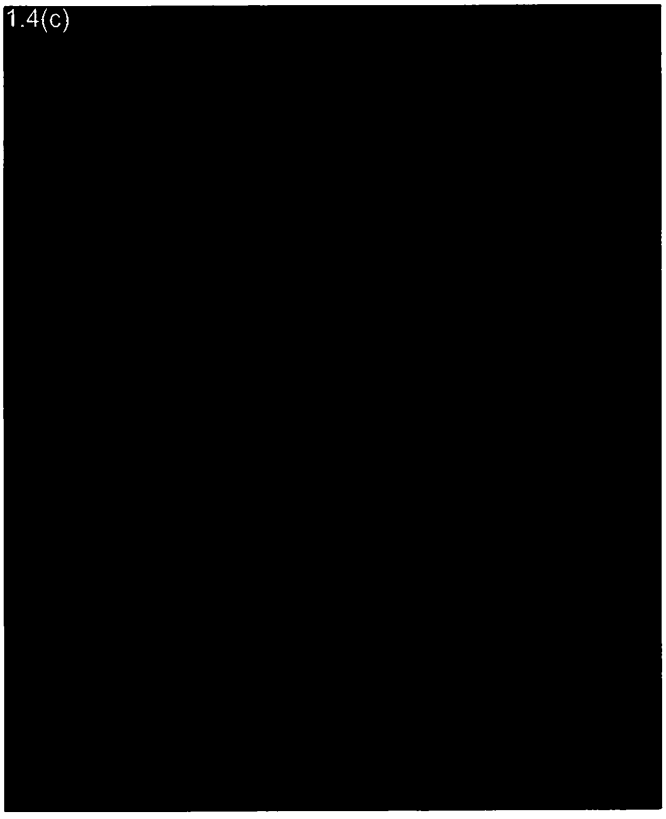
1.4(c)

1.4(c) One of the newest uses of the FIS exploitation of Soviet satellite data was spearheaded by NSA(W14) and DEFSMAC during the 1.4(c) 1.4(c) Through the use of data collected by the 1.4(c) 1.4(c)



~~(TS//SI)~~ Fig. 138. DEFSMAC reporting

1.4(c)



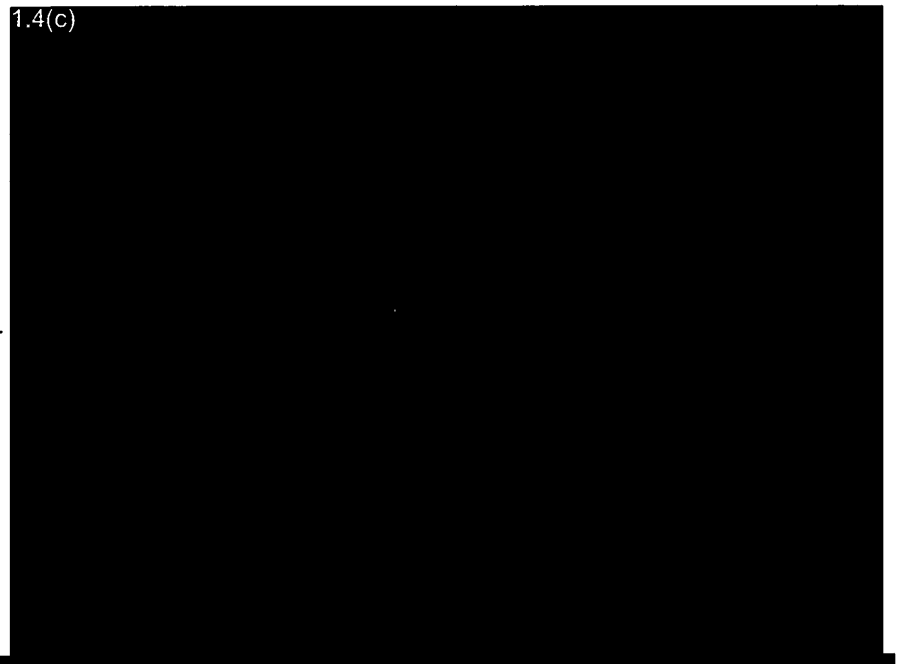
(S) Another key analysis and reporting capability by NSA and DEFSMAC in the 1980s was the PL 86-36/50 USC 3605 series of reports. These reports, based on Soviet 1.4(c) FIS data, projected when Soviet 1.4(c)

operations and/or reports of Soviet ELINT or photographic detection of these operations.[94]

(U) 1980s Summary

(S) The growth of foreign missile and space activities during the 1980s was significant. There were over 3,200 missile and over 80 space launches; DEFSMAC generated over 6,500 product reports on these activities. DEFSMAC provided the field sites with over 230,000 NORAD satellite ephemeris two-line element sets and issued over 2,500 support messages. The FIS field sites generated over 38,000 Telemetry Analysis Reports (TARs).[95]

(S) Providing the U.S. knowledge of Soviet ICBM and SLBM missile warhead performance was a key intelligence topic throughout the 1980s. The triad of PL 86-36/50 USC 3605 1.4(c) 1.4(c) contributed 1.4(c) information on this topic from their coverage of the Kamchatka Soviet missile test impact area using telemetry, radar and optical sensors. In 1983 a complete review of the PL 86-36/50 USC 3605 participation was performed by the USAF with participation of all of the DoD users of that information.[96] Figure 139 shows how this triad provided geographic coverage of the Kamchatka impact area, and Figure 140 shows the contributions these sensors made to key Soviet missile intelligence factors.



~~(S)~~ Fig.139. How telemetry, radar, and optical sensors provided geographic coverage of the Kamchatka impact

~~(S)~~ Fig. 140. The contributions telemetry, radar, and optical sensors made to key Soviet missile intelligence factors

Site/Ship Name	LSRs	TARS	TRAMS	Tapes Made	Tapes Sent
1.4(c)	1.4(c)				
TOTAL					

NOTES:
*- Site sent 3,457 FISDI tapes which reduced analog tapes needed at NSA
LSR – Launch Summary Report
TAR – Telemetry Analysis Report
TRAM – Tracking Message
Tapes Sent – Requested by NSA for probable further analysis
No data available for PL 86-36/50 USC 3605 1.4(c) PL 86-36/50 sites
(e.g. PL 86-36/50 USC 3605

~~(S)~~ Table 3.3. Field analysis and reporting comparisons - 1988

(U//FOUO) Table 3-3 provides an interesting comparison of FISINT collection and field analysis and reporting in the late 1980s. All reports are based on NSA/CSS United States Intelligence Directive (USSID) 105 – Foreign Instrumentation Signals Technical Reporting.

(U) 1980s Lessons Learned

~~(S)~~ **Lesson 1 – Centralized tip-off and collection coordination continued to be the key ingredient in gathering and producing successful intelligence information on missile and space activities.** As the geographic locations used by the Soviets and PRC continued to grow, 1.4(c) even more reliance was placed on DEFSMAC to coordinate the various data collection platforms to obtain optimum intelligence information and results.

(U) **Lesson 2 – The engineering and operational improvements made to almost all the FIS collection systems in the 1980s produced a very robust collection effort.** It was achieved mostly by people and contractor teams who had "grown up" with the early FIS collection and could apply their knowledge appropriately. By the 1980s many people at NSA and other government and contractor teams that participated with collection and processing efforts in the 1960s and 1970s were in key management positions. These people led efforts to efficiently and expertly develop needed FIS collection and field processing systems and procedures for the U.S., and in many cases foreign partners', efforts.

(U) **Lesson 3 – Processing of telemetry FIS data obtained by the various collection systems continued to be a technical and management challenge, despite continual efforts to improve the efficiency and effectiveness of the process.** An effort (called [redacted] PL 86-36/50 USC 3605 to reduce the extensive number of large, heavy, and bulky magnetic tapes that were being couriered back to NSA and CIA by electrically forwarding digitized data was found to be too expensive. Considerable efforts to improve the magnetic tape and information databases were implemented. In the end, only the demise of the Soviet Union brought a solution to this in the early 1990s.

~~(TS//TK)~~ **Lesson 4 – Too much security compartmentation added complexities to the DEFSMAC coordination role.** [redacted] 1.4(c)

[redacted] 1.4(c)

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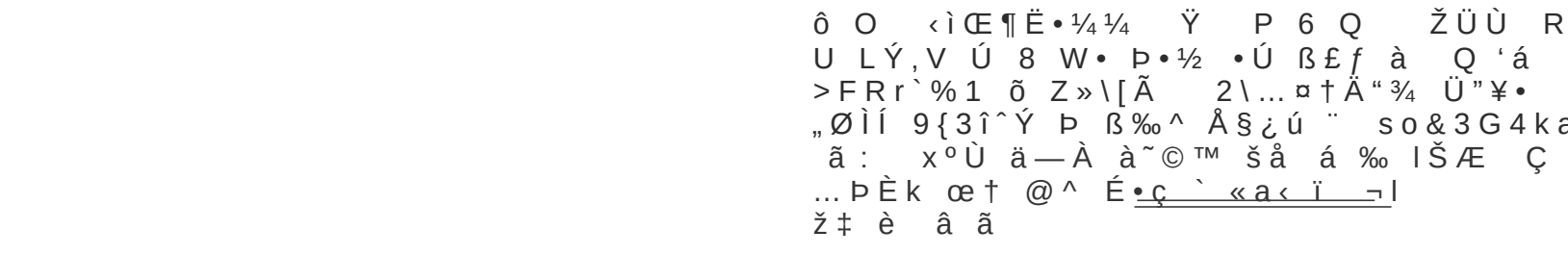
(U) 1970s Lessons learned

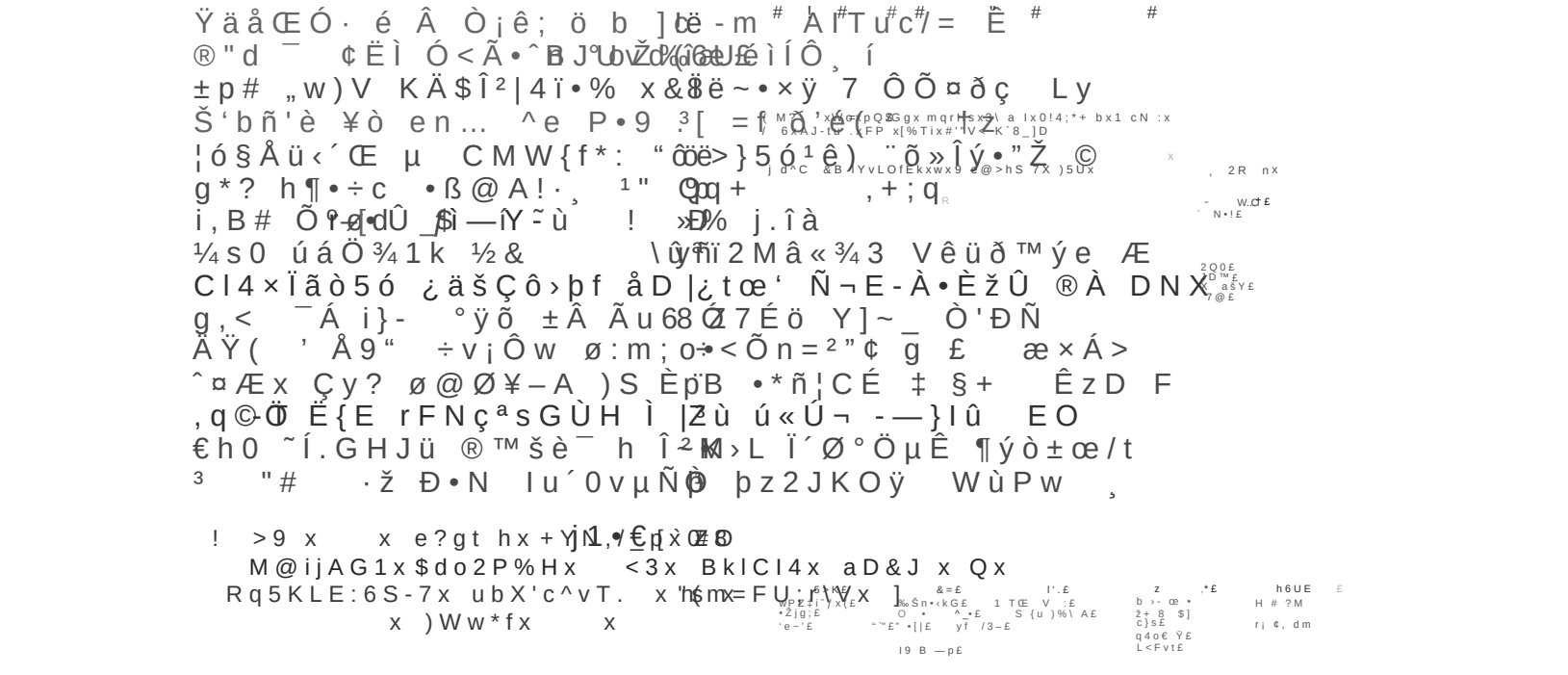
{S} Lesson 1 - The three-year Turkish embargo from 1976 to 1979 made it clear that relying on major ground facilities in one foreign country for collecting some unique FIS information has its limitations. Unfortunately, the laws of physics dictate that, under normal conditions, you have to be within the "line-of-sight" of signals that are above the high frequency HF frequency range in order to intercept them. early

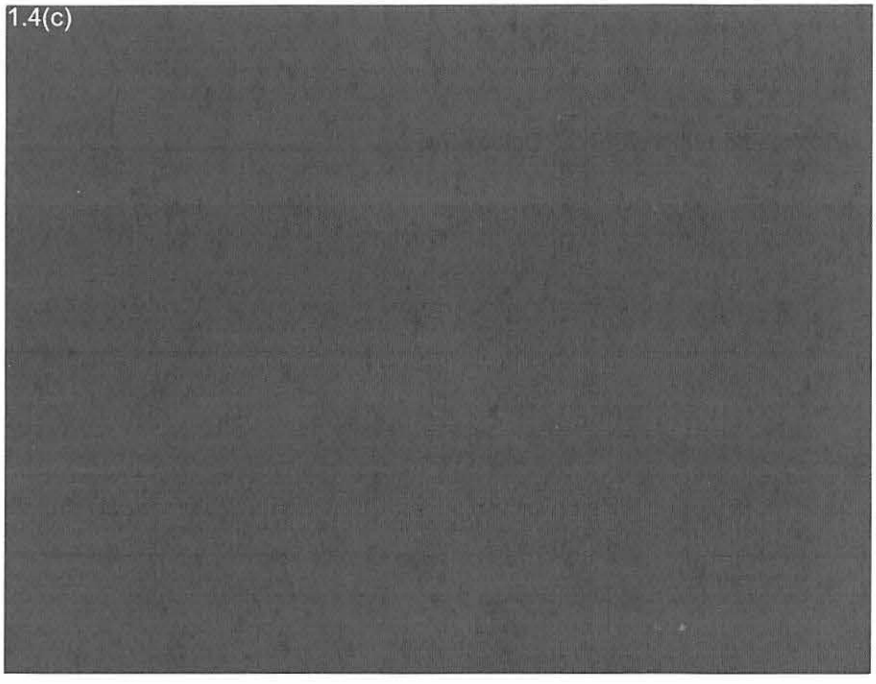
MAN sites in Iran in late 1978 and early 1979 even more vividly confronted the U.S. SIGINT community with these realities.

(S) Lesson 2 - Information processing of large volumes of "un-cooperative" signals from analog tapes, often by several different organizations, is a complex and difficult undertaking. This was quickly reco-

(S) Lesson 3 - Centralized coordination of tasking, tipoff, and real-time collection results proved its value. DEFSMAC got a firm footing in the late 1960s, but really proved its worth in the 1970s when missile and space events both expanded in the Soviet Union and commenced in the PRC.







(~~S//TK~~) Fig. 210. DEFSMAC 2000 connectivity

(~~C~~) The NSA component of DEFSMAC, W9D, became PIW1 in early 2000. In this reorganization the "analytic" elements doing "missiles" and reporting (PIW17) joined the traditional "Operations Center" (PIW11) and "Initial Reporting" (PIW14 and PIW16) functions in DEFSMAC. TEBAC, Target Plans, Dissemination, and Weapons and Space Language Analysis also became part of PIW1. "Space" analysis became part of PIX, Information Operations Support, as PIX23.

(~~C~~) In the middle of 2000, the NSA inspector general completed an organizational inspection of DEFSMAC. A key recommendation was that the director of DEFSMAC return to being a separate NSA senior executive position and that the chief of Weapons and Space not be "dual hatted" as DEFSMAC director. This resulted in the appointment of PL 86-36/50 as DEFSMAC director in late 2000. Also it was again considered that a five-team watch operation (similar to NSOC) be established, instead of the existing four team rotation, to improve morale. This idea was dropped in view of the continued pressure to not increase billets at NSA. It was also recommended that DIA and NSA review the 1964 DEFSMAC DoD Directive "Charter" for DEFSMAC. This was done informally as part of the DIA reassessment of its role in DEFSMAC. [150]

(~~C~~) The NSA portion of DEFSMAC, P1W1, became PIW4 in November 2000. With the formation of PIW4, the Missiles long-term SIGINT reporting and Space long-term SIGINT reporting became part of PIW5. The "weapons" SIGINT analytic function was also transferred to PIW5, the Technical SIGINT Exploitation Division, as PIW53. The "space" analytic functions administratively remained as PIW56 but was matrixed to the Office of SIGINT Support to Information Operations. Once again DEFSMAC was back to its "origins" and had current operations as its core (PIW41). This organization was headed by PL 86-36/50 Early all-source analysis and reporting on missiles (PIW42) was headed by Bill Harrigan of DIA, and early all-source analysis on foreign space (PIW43) was headed by PL 86-36/50 USC 3605 PL 86-36/50 USC 3605 a long-term DEFSMAC senior analyst and manager, became the DEFSMAC staff chief. James Kline, a long-term DEFSMAC manager, had retired in October 2001, as had Walter Stevens, the operations technical director. Figure 211 illustrates the care that Stevens had developed in support the 1.4(c) facilities over twenty-five years of service in

Date: Fri, 8 Dec 2000 08:12:26 -0500 (EST)
From: "Walter J. Stevens" <wjstev1@defsmac.do.nsa>
To: rlberna@nsa
Subject: PERSONNEL CHANGES
Classification: SECRET
PL 86-36/50 USC 3605

Classification: ~~SECRET~~

~~SECRET~~
ACODEASP/DCO1/S00,HB/P?/514,DCA1,DW9T,DOC1,DCO1,DST2,GLRY//
FM DEFSMAC DIRECTOR OF OPERATIONS (JIM KLINE)
TO: 1.4(c)

DTG 0612452 DEC 00
SUBJECT: PERSONNEL CHANGES

1. THIS IS TO INFORM YOU THAT WALTER J. (WALT) STEVENS WILL BE RETIRING AS DEFSMAC'S OPERATIONAL TECHNICAL DIRECTOR AT THE END OF THIS MONTH. HIS DUTIES WILL BE ASSUMED BY MR. PL 86-36/50 USC FROM NSA OFFICE PL 86-36/50
PL 86-36/50 USC 3605

2. I ANTICIPATE A SMOOTH TRANSITION FOLLOWING WALT'S RETIREMENT BUT ASK THAT YOU INCLUDE MY ADDRESS DCO1 ON ALL MESSAGES YOU SEND THAT REQUIRE AN ACTION.

3. WALT HAS FAITHFULLY SERVED OUR MUTUAL MISSION FOR MANY YEARS AND WE WISH HIM WELL IN HIS FUTURE PLANS.

REGARDS,
JIM KLINE
DIRECTOR OF OPERATIONS
DEFSMAC

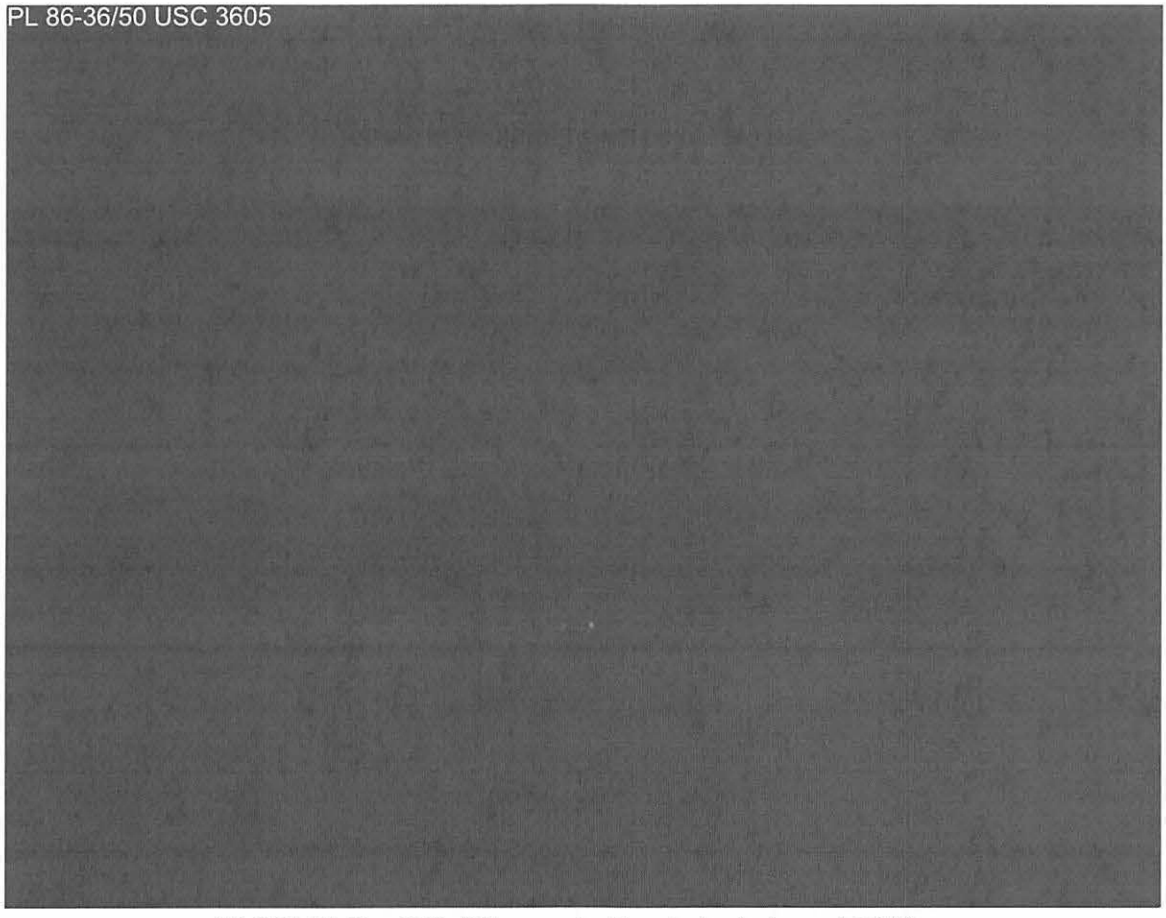
~~(S)~~ Fig. 211. DEFSMAC
1.4(c)

DEFSMAC. In December 2001, PL 86-36/50 USC 3605 combined the DEFSMAC missile and space analytic areas to form the Intelligence Missile and Space organization under Mr. Harrigan, and PL 86-36/50 USC 3605 became the DEFSMAC chief of staff. At this time the data systems support organization was in S212, Technology Services, and seven of its members, primarily performing day-to-day DEFSMAC support remain collocated with the DEFSMAC Center.

~~(C)~~ The PIW designations were not to last very long. In early 2001, the former DO (SIGINT Operations) and DT (Telecommunications and Research) merged into the SIGINT Directorate (SI). This caused PIW to become S2J, the Office of Weapons and Space. DEFSMAC became S2J2.

~~(C)~~ With the 2002 reorganization, Weapons Systems, e.g., missile systems, became part of S2J3, the Technical Signals Exploitation Group. Space Systems became S2J36. FISINT and Signals Analysis (signals processing) became S2J37. The former DEFSMAC/NSA/W11 SIGINT sharp focus on the tasking function just sort of "disappeared" except for the OCMC focal point for Weapons and Space overhead topics. The FIS aspects of Signals Research and Target Development became S2J11. The remainder of the S2J Weapons and Space organizations were focused on ELINT and PROFORMA. The complete S2J organization chart, as of August 2002, is shown in figure 212.

(U//FOUO) In early 2000 DIA had proposed to replace all DIA personnel in DEFSMAC (then about eleven billets) with collaborative computer mechanisms so that the DIA DEFSMAC functions could be performed at DIA Headquarters and/or the DoD Science and Technology Centers. A joint DEFSMAC, NSA and DIA study, with other affected DEFSMAC participants and customers, was completed in July 2000. The report recommended that some DIA presence continued to be required within the DEFSMAC operations and reporting area. DIA decided to leave about six people integrated into the



(U//FOUO) Fig. 212. S2J organizational chart, August 2001

Center, concentrated in the analysis and reporting function, and including the DEFSMAC deputy director position.[51] In 2001, DIA changed its headquarters focal point for DIA DEFSMAC participation from its long association with the Directorate for Collection (CL) to the Technical Assessments Group in the Directorate for Intelligence, Analysis, and Production (DITA). In early 2002, DIA assigned the first civilian DEFSMAC deputy director, Deirdre Bumbera. All previous deputy directors since 1964 had been U.S. Air Force colonels.

(U) In mid-2002 the USSPACECOM reorganized and the North American Aerospace Defense Command (NORAD) became part of the United States Northern Command (USNORTHCOM). NORAD will stay in Colorado Springs, and there should be little change in DEFSMAC/NORAD relationships. PL 86-36/50 USC 3605 was appointed at the NSA/CSS representative to USNORTHCOM and NORAD, and Jack Bobela will remain as the DEFSMAC exchange officer to NORAD. It is not yet clear how DEFSMAC activities with the new U.S. Strategic Command to be located in Omaha, Nebraska, will be arranged.

~~(S//TK)~~ In 2001 and 2002, after a study by the U.S. ELINT community, led by the recently formed Community ELINT Management Office (CEMO) located at NSA, it was concluded that ELINT needed a better focus and cohesion that could best be obtained by centralizing many of the function in

1.4(c)

1.4(c)

1.4(c) It was concluded that DEFSMAC should remain at its present location, housed at NSA with continued DIA participation. In August of 2003, DIRNSA consolidated

1.4(c)

~~(C)~~ The first plan for building and outfitting the SIGINT Missile and Astronautics Center (SMAC), which preceded DEFSMAC, operations and reporting facility at NSA was completed in August 1962.[152] The Center had been "modernized" and improved in an incremental fashion several times, mostly through automation and other computer database support. The move of the Center from the second floor of the NSA Operations building to the first floor was the first major "physical" upgrade. After almost four years of operations in the "new" DEFSMAC center on the first floor or the NSA OPS-1 building, DEFSMAC was once again ready for physical, mostly computer and other electronic, upgrades. A plan was developed in March of 2002 (forty years later from 1962) calling for an investment of over PL 86-36/50 USC 3605 for five phases over six years. Also, the NSA Information Technology Infrastructure Services (ITIS) organization has prepared a DEFSMAC Transition Management Plan to transition the DEFSMAC Distributed Computing services from the Internal Service Provider (ISP)/A16 to the External Service Provider (ESP)/Eagle Alliance (EA). The DEFSMAC Modernization Acquisition Plan was expanded and distributed in September of 2002.

(U//FOUO) In late 2001 the Office of the assistant secretary of defense for C3I decided to review the DEFSMAC charter, the DoD Directive of 1964. After review and discussion with all of the affected DoD organizations, ASD(C3I) decided to reissue the DoD directive with just a few minor changes to the mission and functions of DEFSMAC. The title of DEFSMAC was changed to the Defense Special Missile and Aerospace Center. The ASD(C3I) reviewer said:

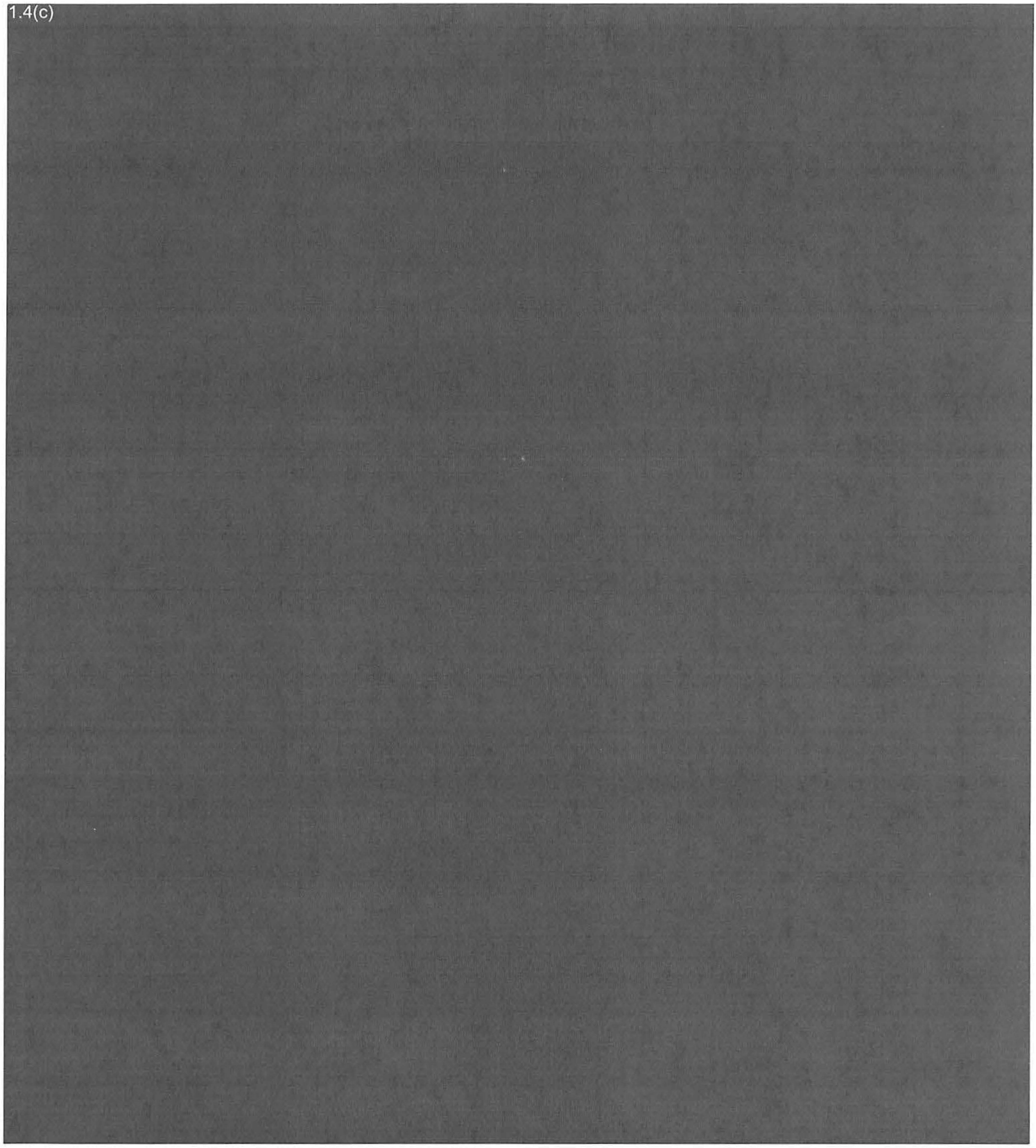
> ***DEFSMAC will not only survive in the 21st century, it will thrive.***

(U) The new charter, DoD Directive S5100.43, was signed by Deputy Secretary of Defense Paul Wolfowitz and was dated September 19, 2002.[153] The first annual joint NSA/DIA report to the DoD under secretary of defense for intelligence, as called for by the new directive, was released by Lieutenant General Michael V. Hayden, USAF, Director, NSA/Chief CSS, on 5 December 2003.[154]

(U) Collection Facilities/Platform Changes

1.4(c)

1.4(c)

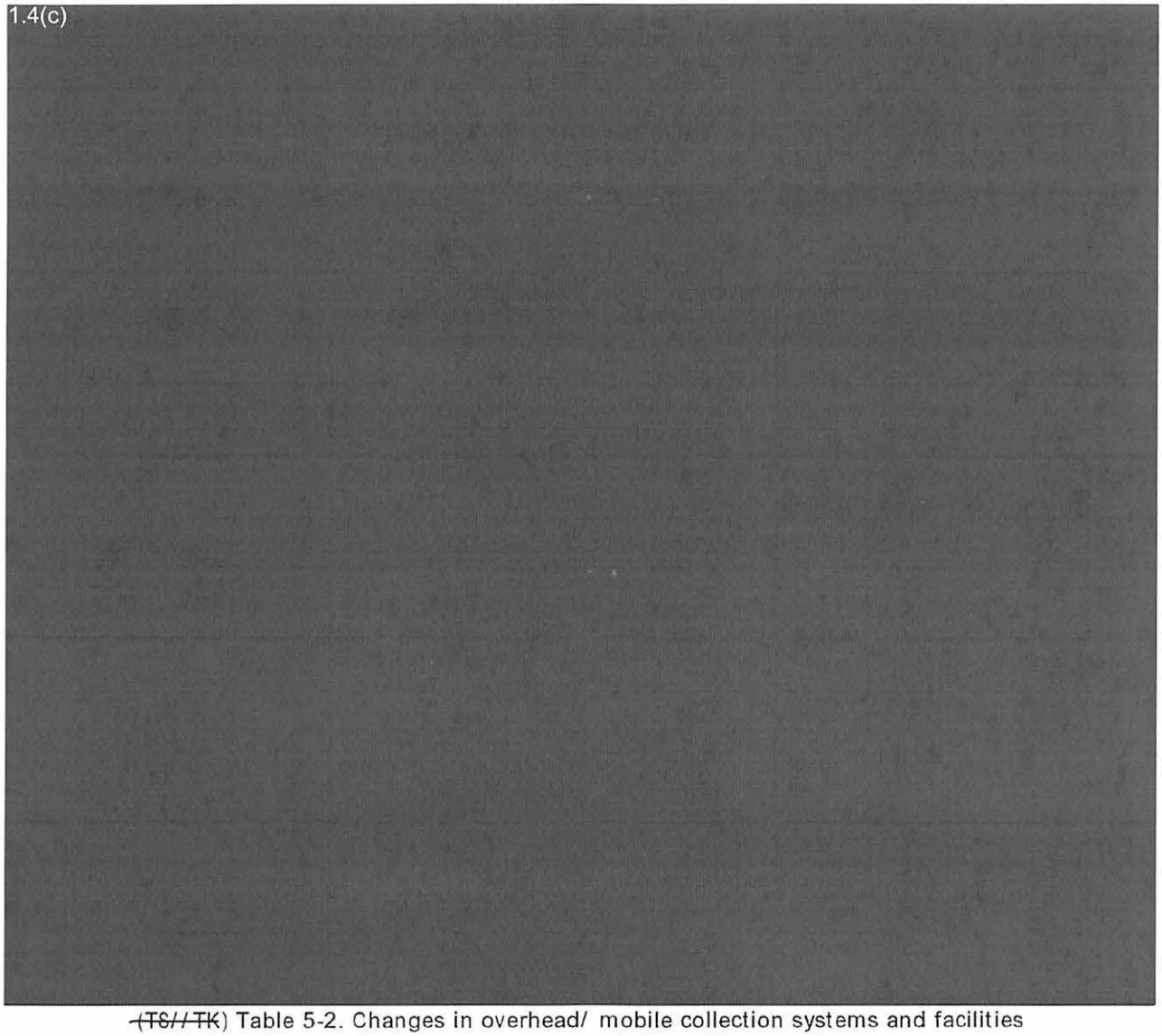


(U//FOUO) Table 5-1 gives an overview of the changes in ground site collection posture from the 1980s until 2002. It is easy to see the significant reduction that has occurred in major ground locations.

Ground Sites	Facility Location	Status in 2002
1.4(c)		

Note: Color type designates closed sites.

~~(S//SI)~~ Table 5-1. Ground site collection changes from 1980s to 2002



~~(TS//TK~~) Table 5-2. Changes in overhead/ mobile collection systems and facilities

(U//FOUO) Table 5-2 gives an overview of the many other FIS collection assets.

~~(S)~~ The use of PL 86-36/50 deployments continued in 2000 and to date. Table 5-3 shows some selected efforts.

Year	Project	Location	Target
2000	1.4(c)		
2001			
2002			

~~(TS)~~ Table 5-3. Selected PL 86-36/50 USC 3605 Deployments after 1999

(U) FIS Data Processing

~~(S//TK)~~ There were only very limited sets of field processing upgrades planned for 2003. Minor improvements have continued to be made for 1.4(c)

~~(S)~~ With only one PL 86-36/50 and with two PL positions, PL 86-36/50 USC 3605 PL 86-36/50 The two PL positions will continue to receive and process analog signal tapes, primarily to produce FISDI files for further analysis. The PL equipment is limited to processing the Missile PL 86-36/50 USC signal tapes received PL 86-36/50

~~(S)~~ One new initiative for 2003 is the PL effort to produce a "Super-TAR." This joint effort with the USAF was deferred in 2002 but was scheduled to restart in 2003 with NSA funding. PL provides FIS customers with PL 86-36/50 USC situation awareness by processing FIS data to produce an PL 86-36/50 USC that translates the collected FIS data into 1.4(c) 1.4(c) that can be used directly by the FIS customer.

(U) Important Analytic Results

~~(S)~~ The launch of the 1.4(c) in 2001 allowed DEFSMAC and the collection community to once again use the 1.4(c) 1.4(c) mechanism to affect extensive FIS and other intelligence data collection. Figure 214 shows the results of this operation.

1.4(c)

1.4(c)

~~(TS//SI//TK)~~ Fig. 214. Collection summary

(U) 2000 - 2003 Summary

~~(TS//SI)~~ The new millennium has not brought significant change to the FIS collection assets sponsored by the U.S. or to its allies and partners engaged in FIS activities. The continued diversity of foreign countries launching missiles and satellites continues to strain the available resources 1.4(c) 1.4(c)

Location	Target
1.4(c)	

~~(S)~~ By mid-2002, the many reorganizations at NSA and DIA affecting DEFSMAC began to settle down. This should allow for a more stable management environment in which to effect planning of all NSA FIS activities. While it was once considered that DEFSMAC move 1.4(c) along with a significant portion of the Office of Weapons and Space ELINT functions, it has now been decided to have the DEFSMAC NSA/DIA team remain located within the NSA Operations Building at Fort Meade.

~~(S)~~ The approved planning and budgeting for the DEFSMAC watch center and computer support updating and modernization, and the budget approval for the PL 86-36/50 TAR automation, should provide additional efficiencies and effectiveness of FISINT activities. A congressional-directed review of FIS analysis in 2003 has refocused efforts on a 1.4(c) 1.4(c) This is covered in Objective 1 of NSA's five-year strategic plan.

(U) The revised and updated DEFSMAC charter, issued by DoD in September 2002, firmly solidifies the DEFSMAC mission well into the 21st century.[155]

(U) New Millennium Observations

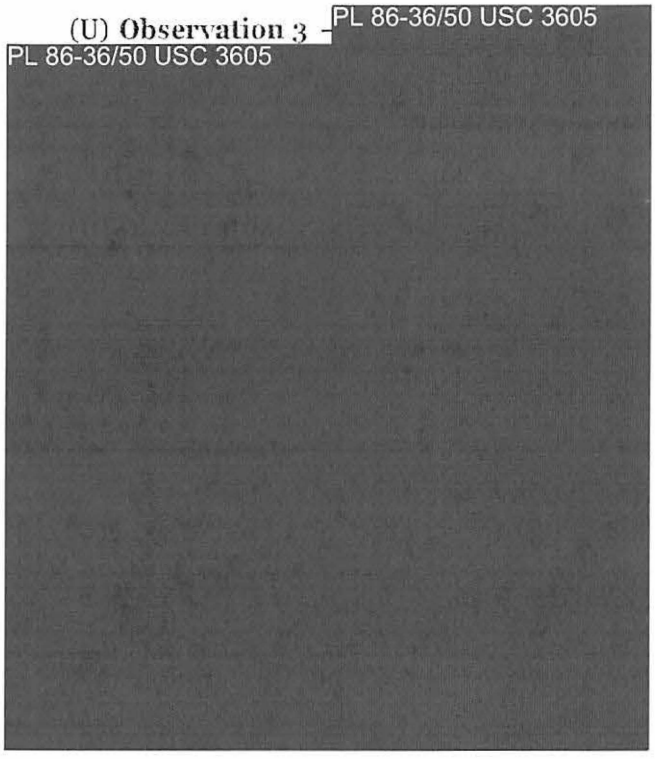
Note: It should be noted that while the "Lessons Learned" sections of the previous chapters (1970s and 1980s) and in Volume 1 (the 1950s and 1960s) were based on extensive documented sets of circumstances. For this chapter this section is largely based on the impression this writer has gathered from limited data and limited discussion with current managers at NSA, CIA, and in industry. They are therefore called "observations" rather than "lessons learned."

~~(TS/TK)~~ **Observation 1 – If you couldn't "do more with less" in the 1990s, you surely can't with even less in the 2000s.** The only 1.4(c) 1.4(c) have remained robust, and the move of the PL 86-36/50 and the use of the 1.4(c) site have helped FIS collection against an expanded list of targets. The continuing expansion of nations adding to their offensive missile and space reconnaissance capabilities continues to challenge DEFSMAC and the FISINT (as well as other SIGINT, MASINT and IMINT) collection managers to provide collection resources for all the potential intelligence targets.

~~(S)~~ **Observation 2 –** 1.4(c) 1.4(c)

(U) Observation 3 – PL 86-36/50 USC 3605

PL 86-36/50 USC 3605



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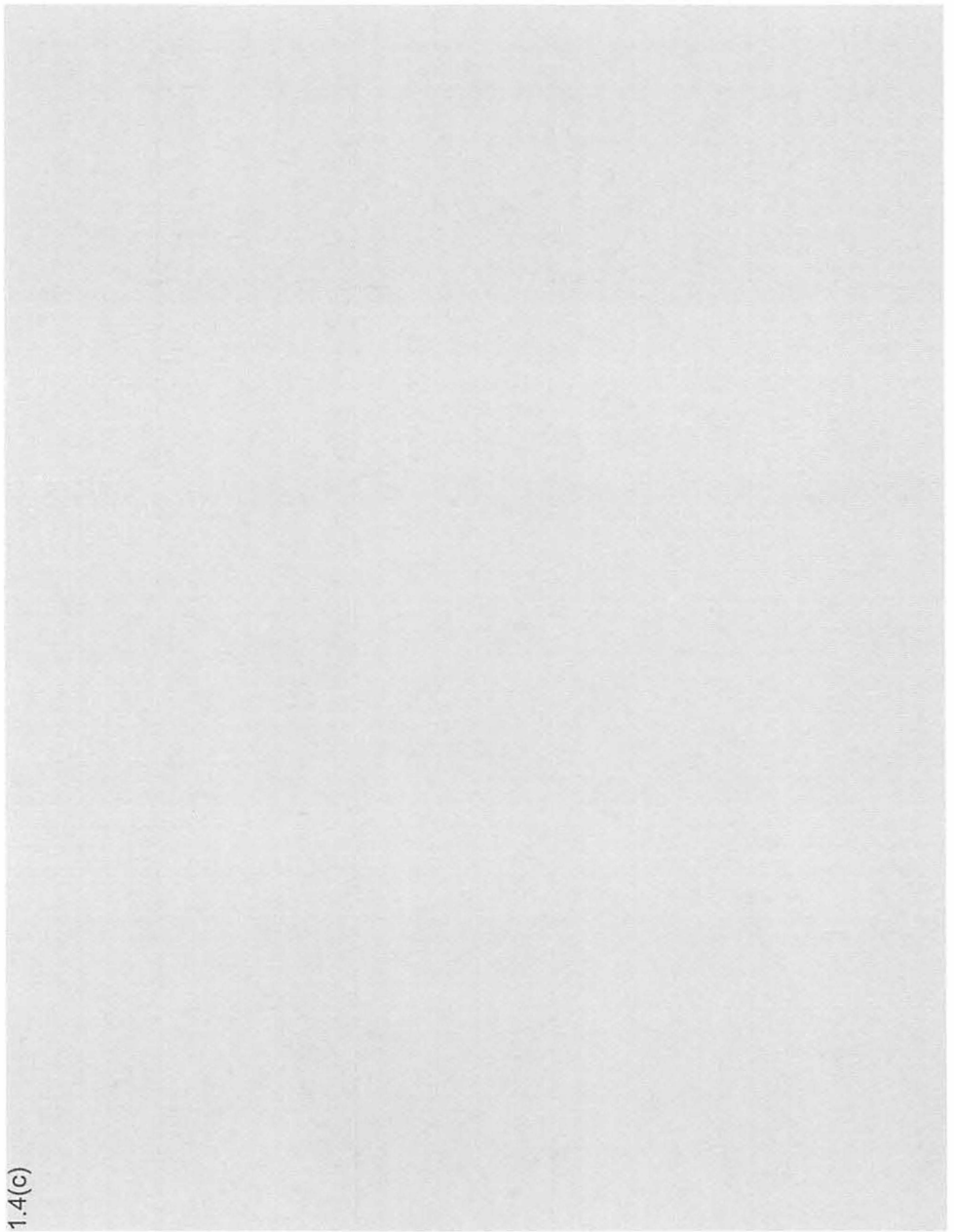
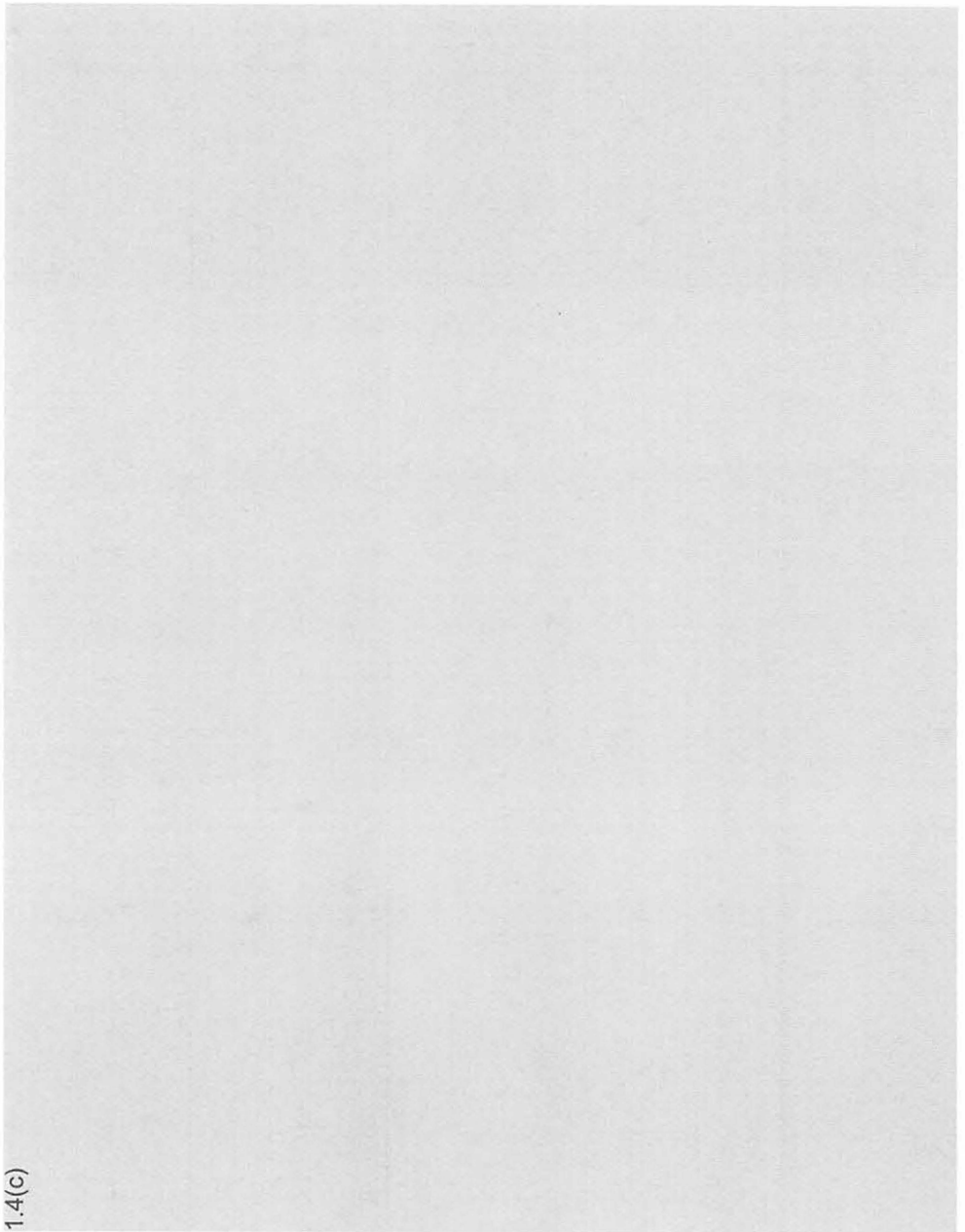


1.4(c)

139



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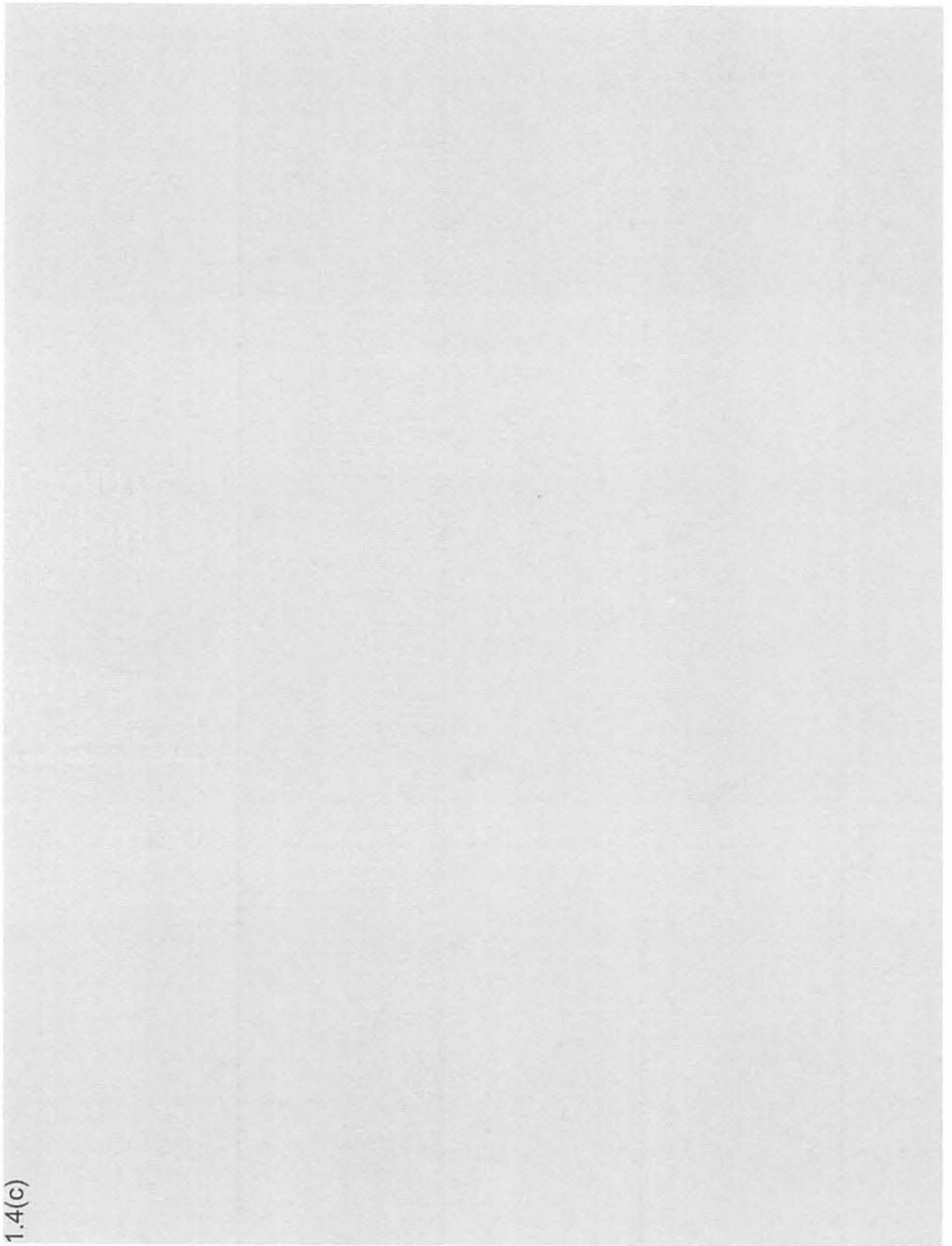

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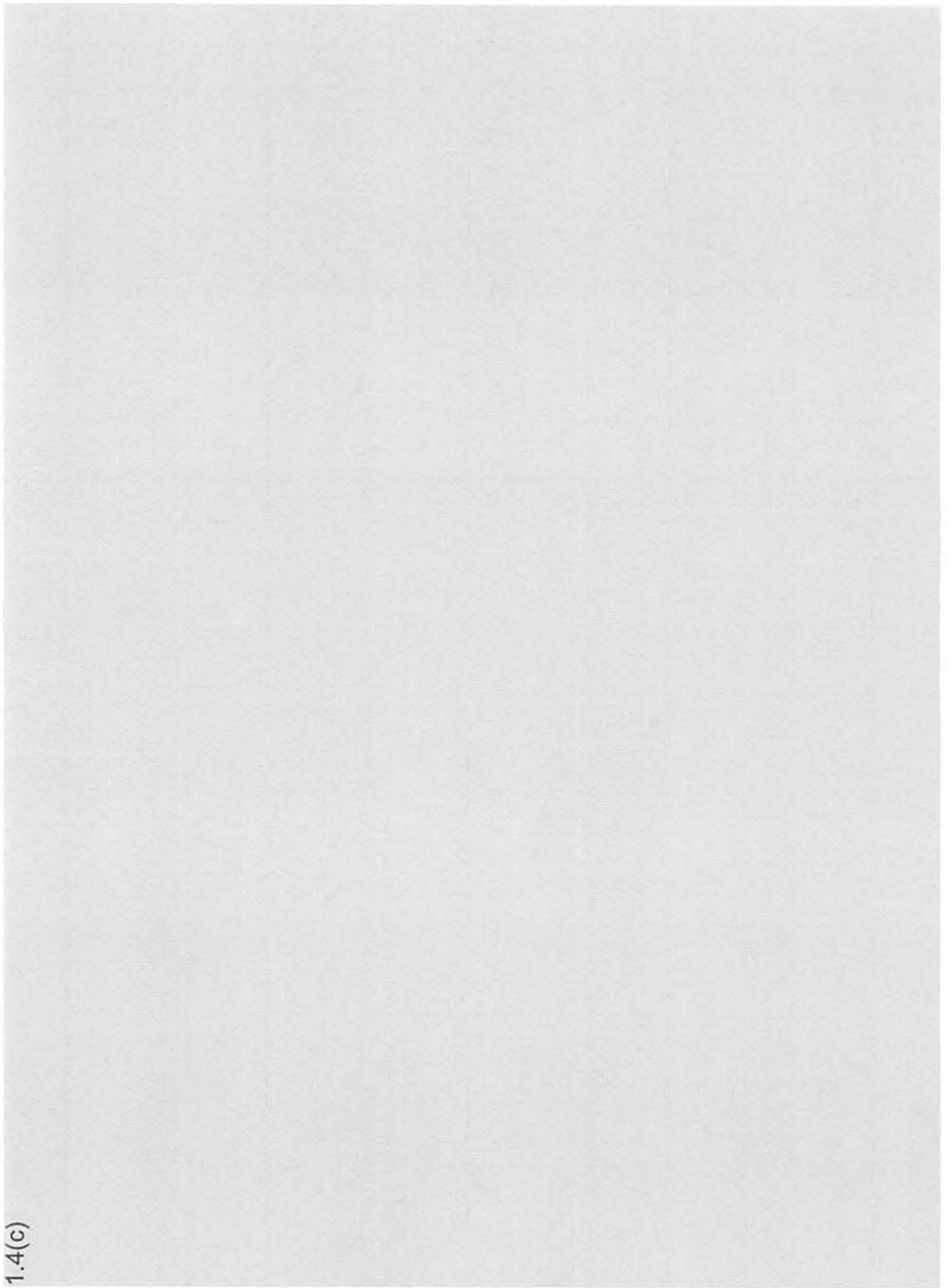

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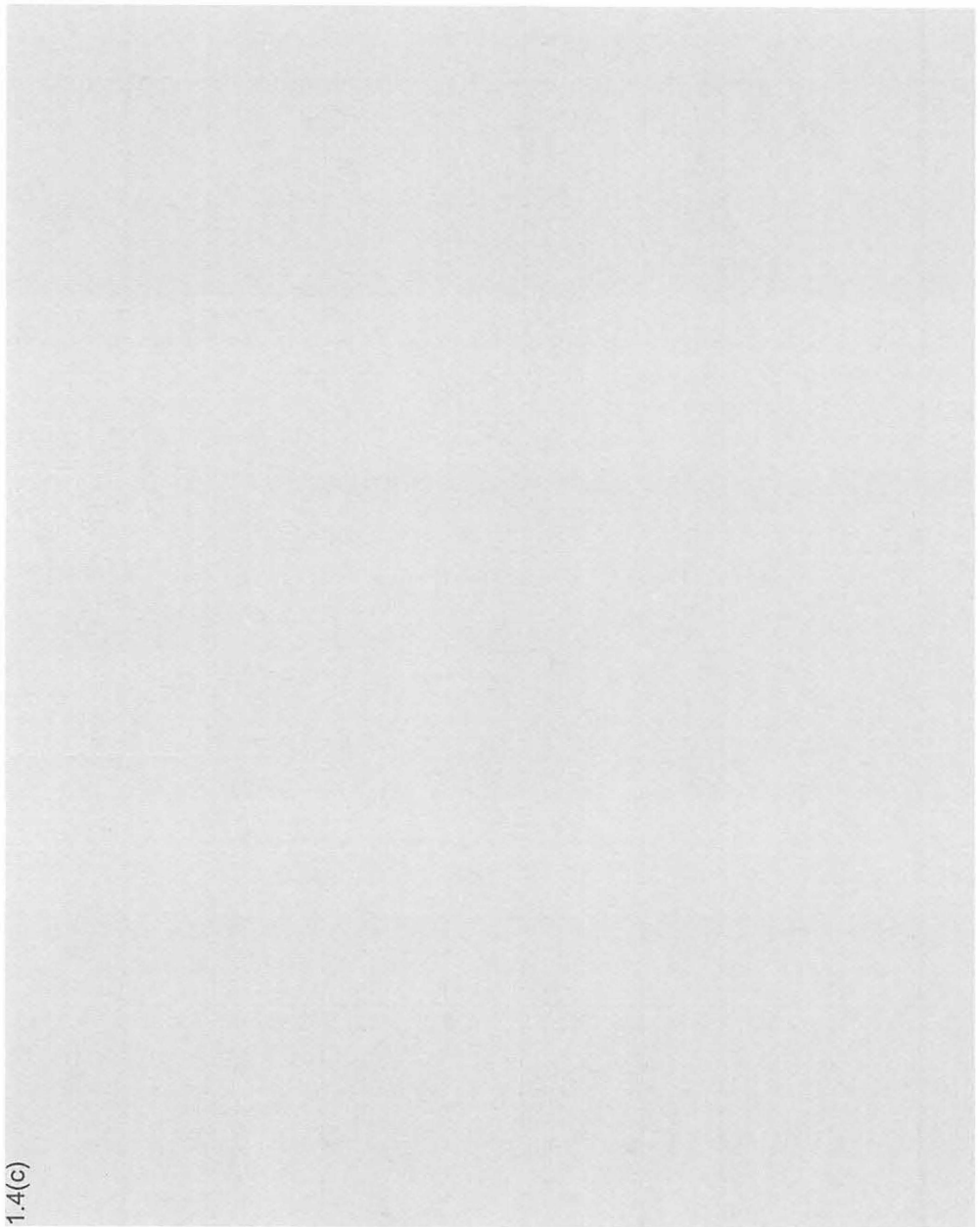

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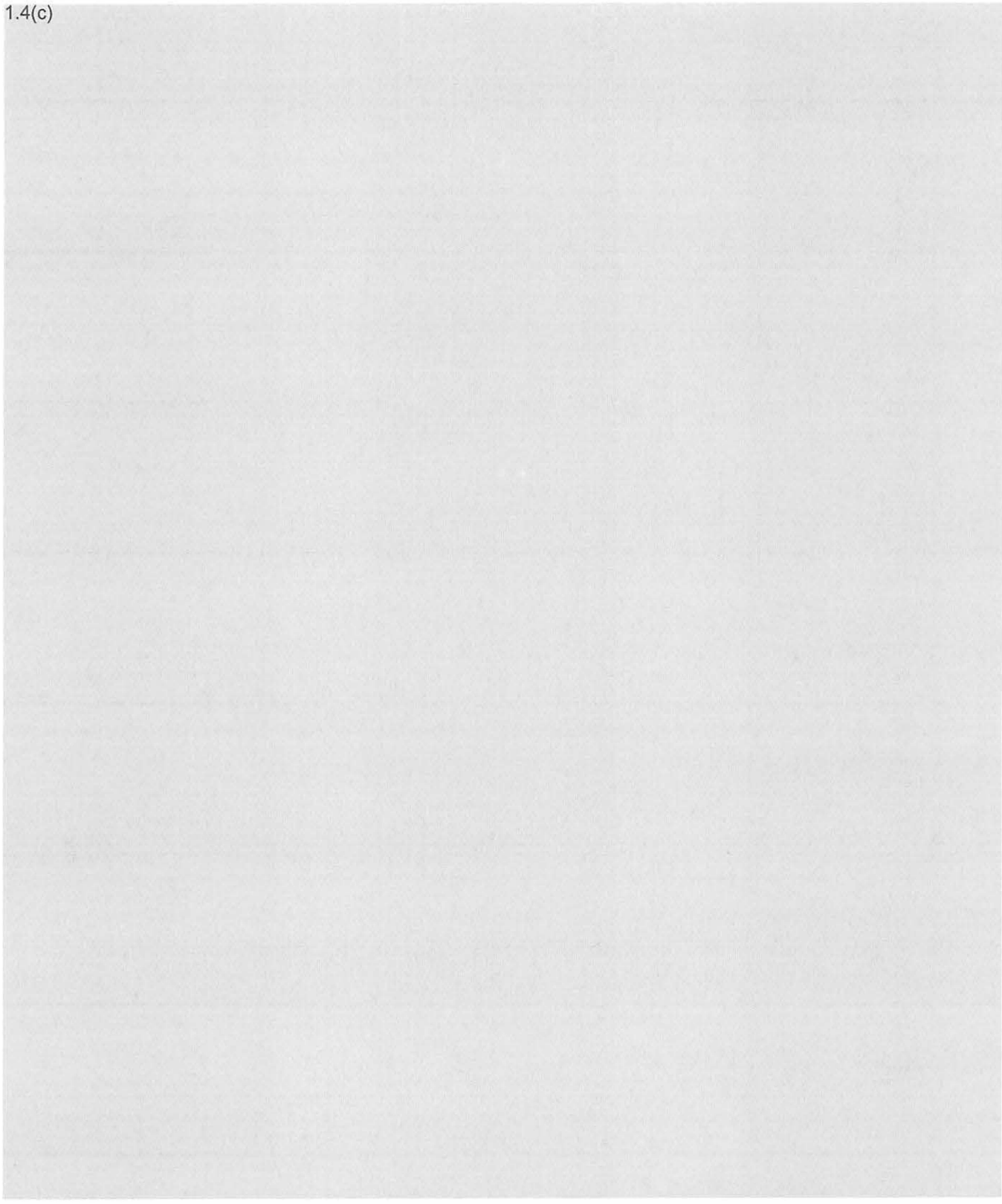

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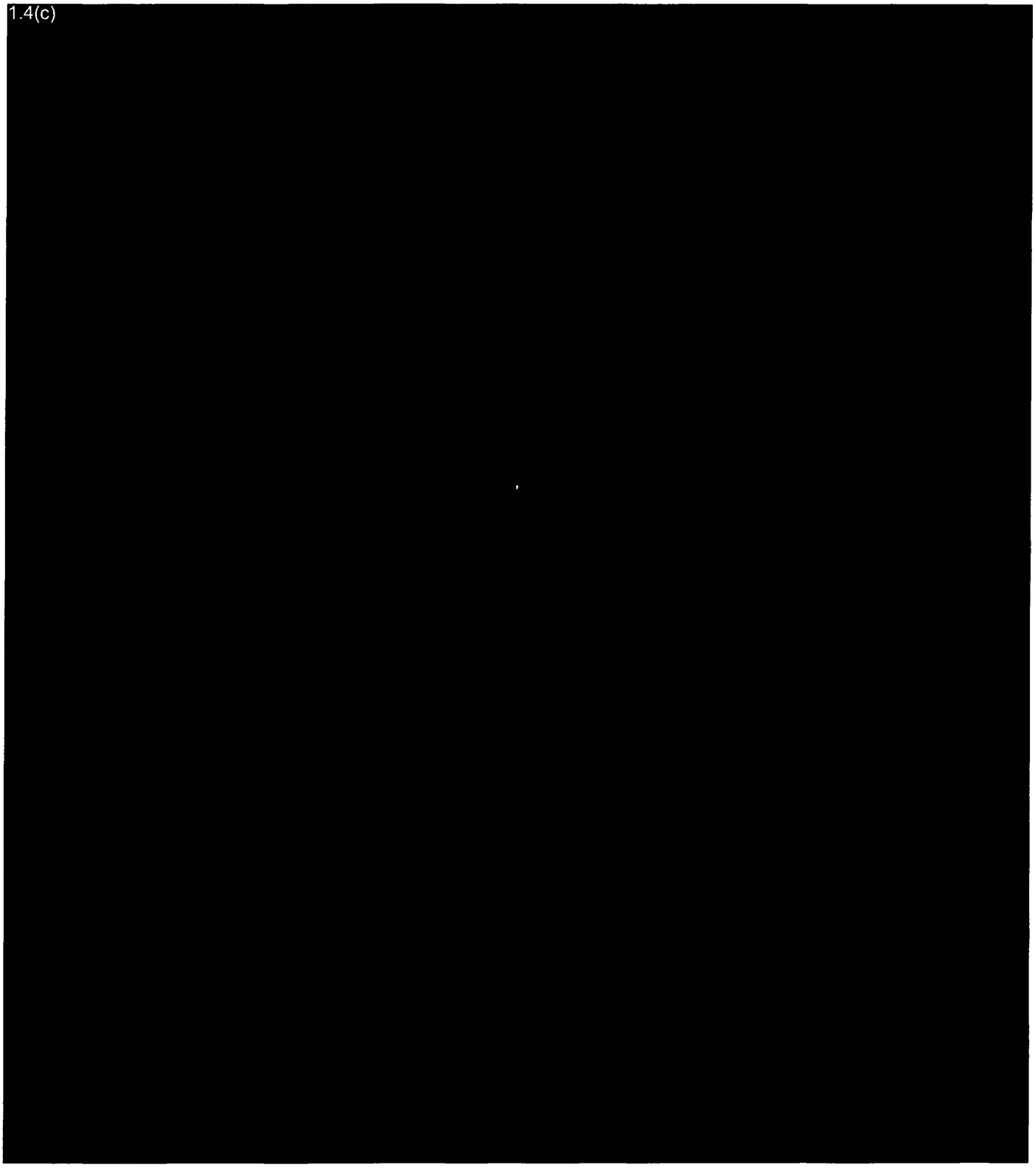

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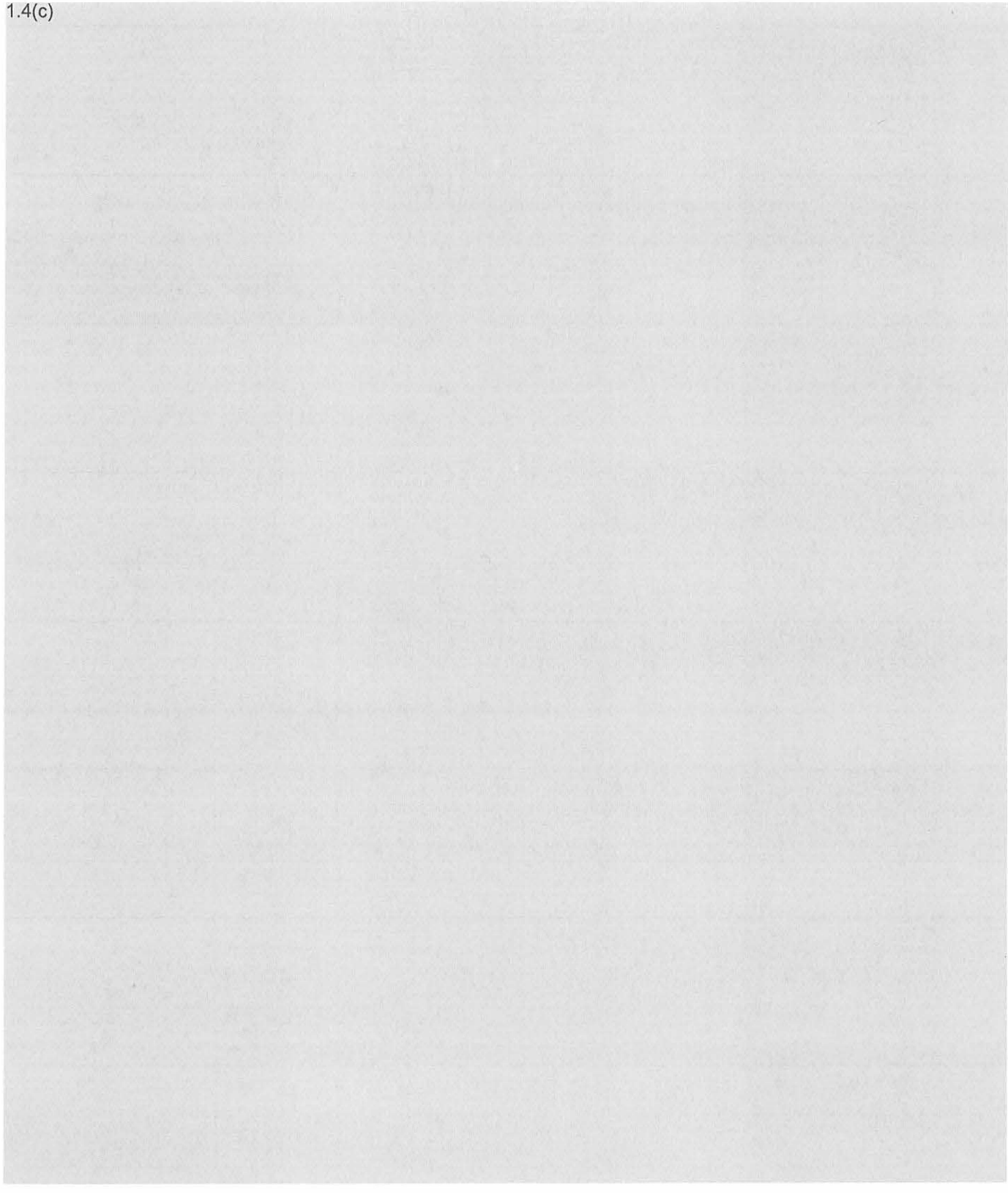

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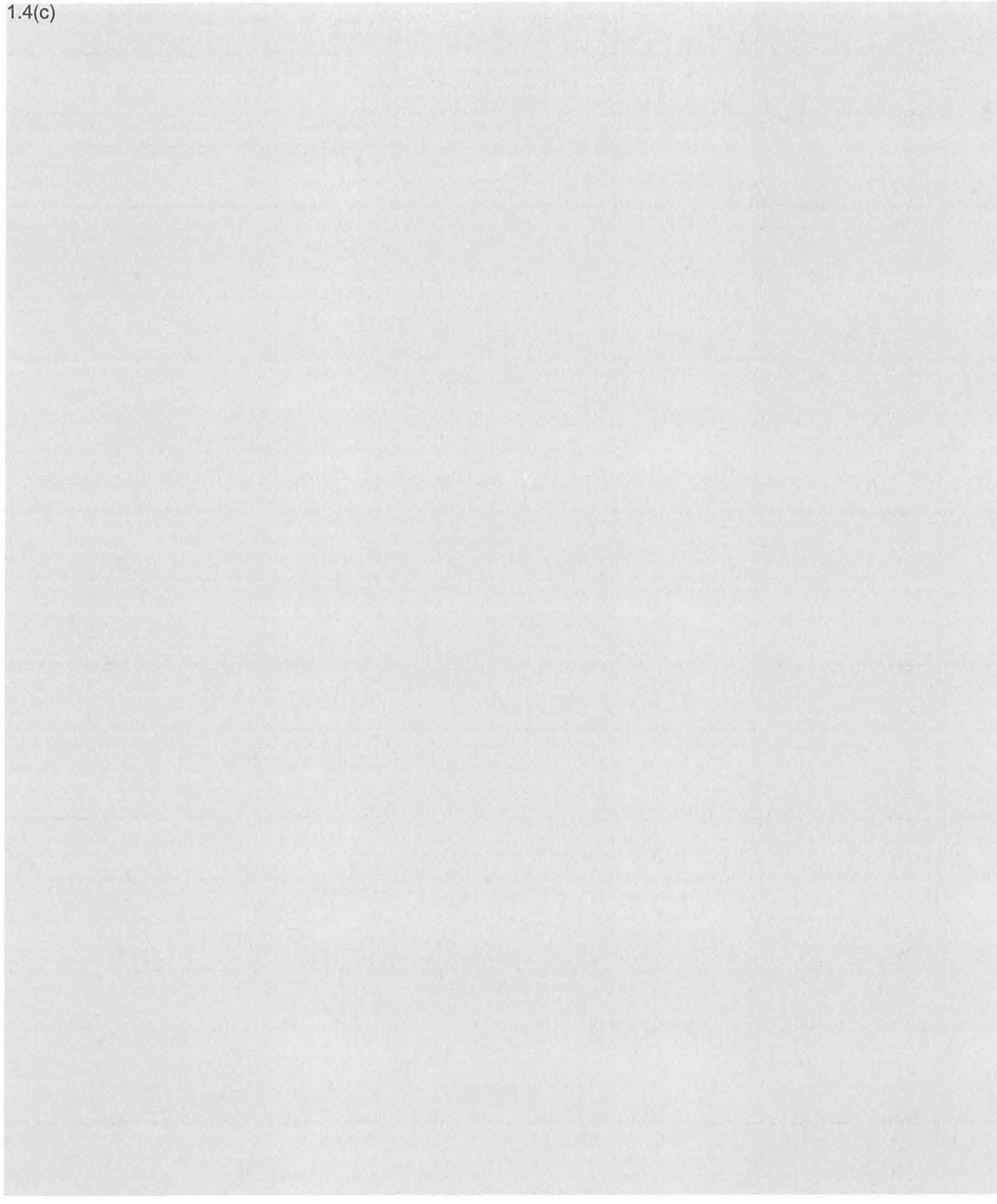

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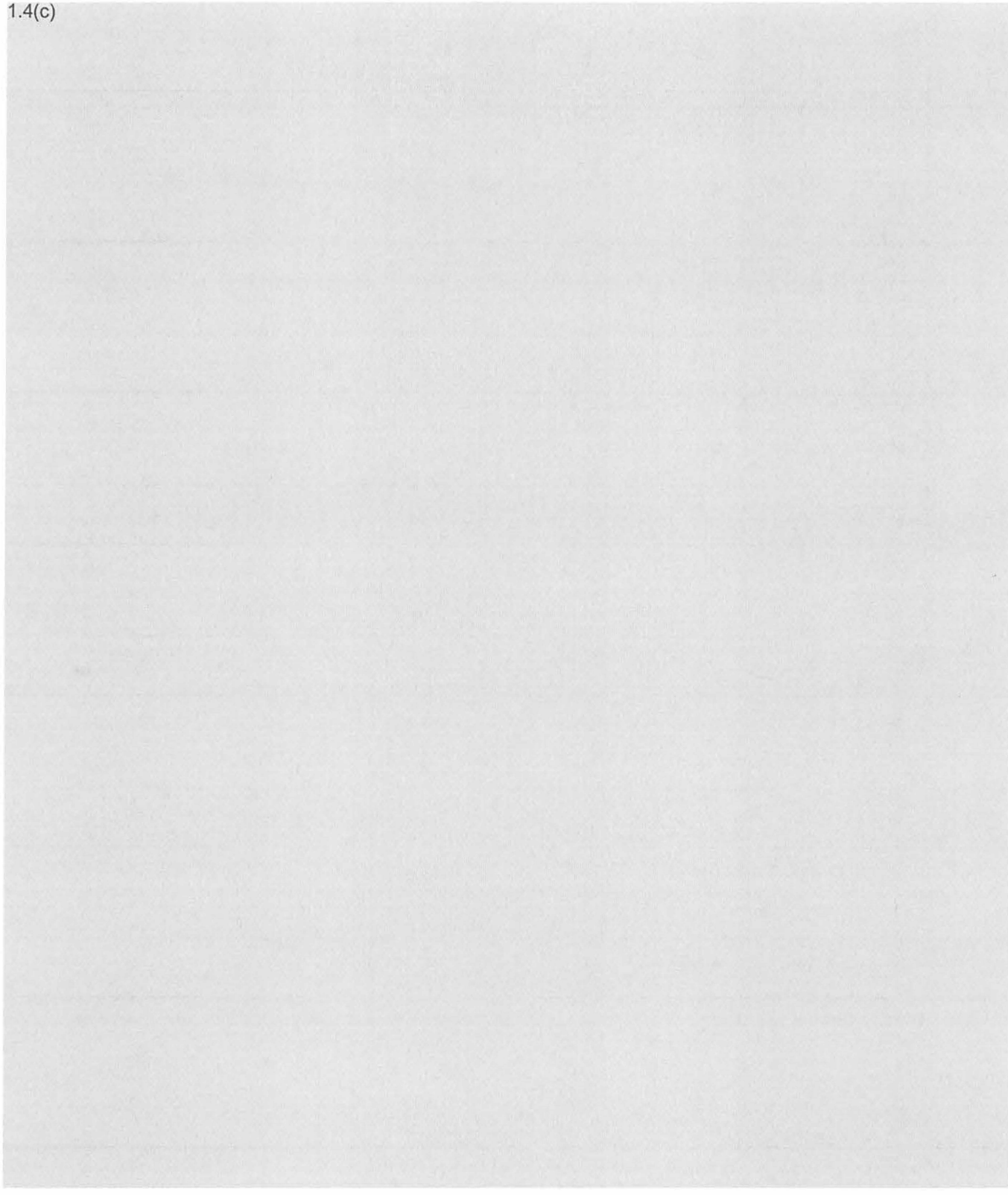

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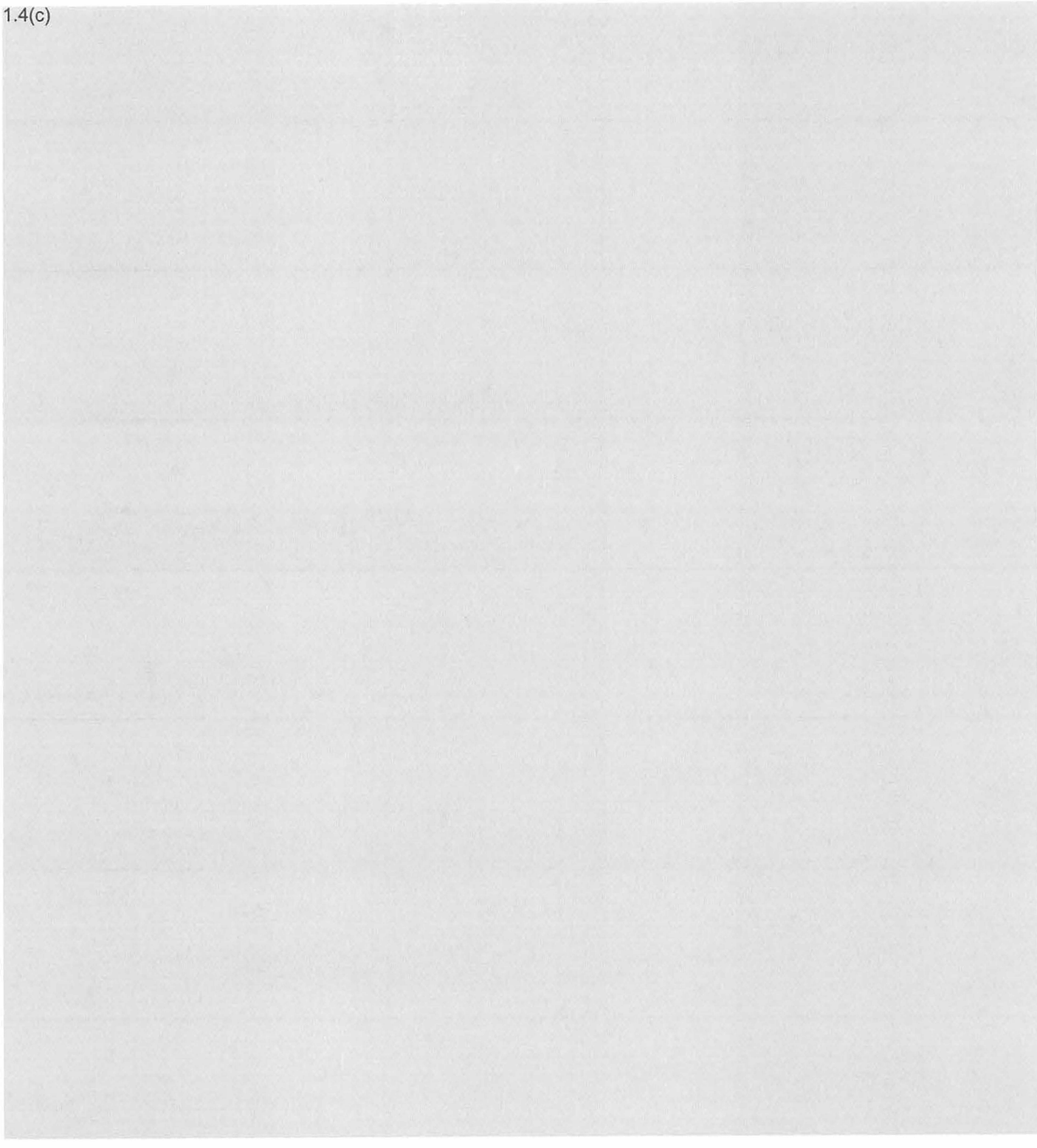

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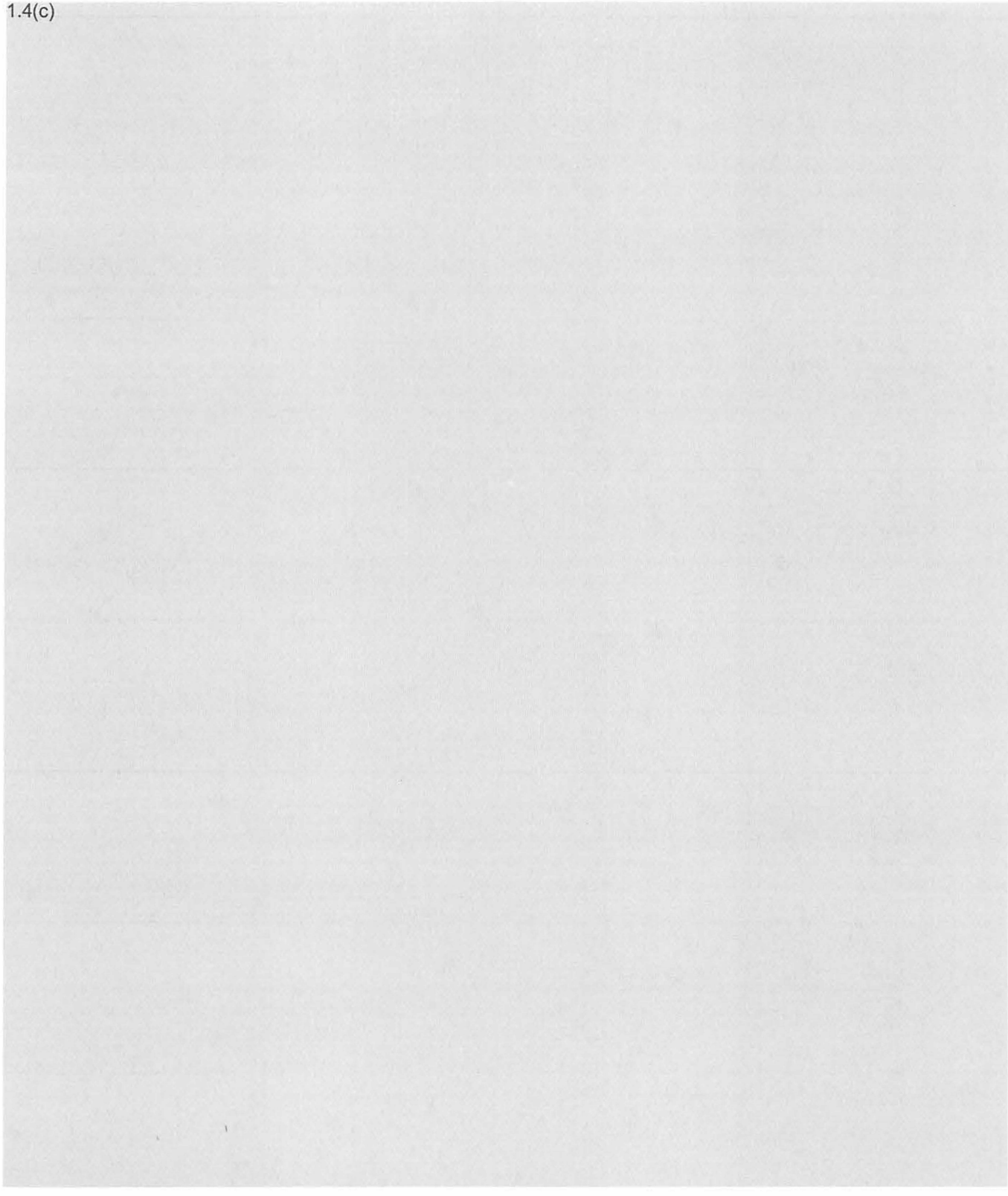

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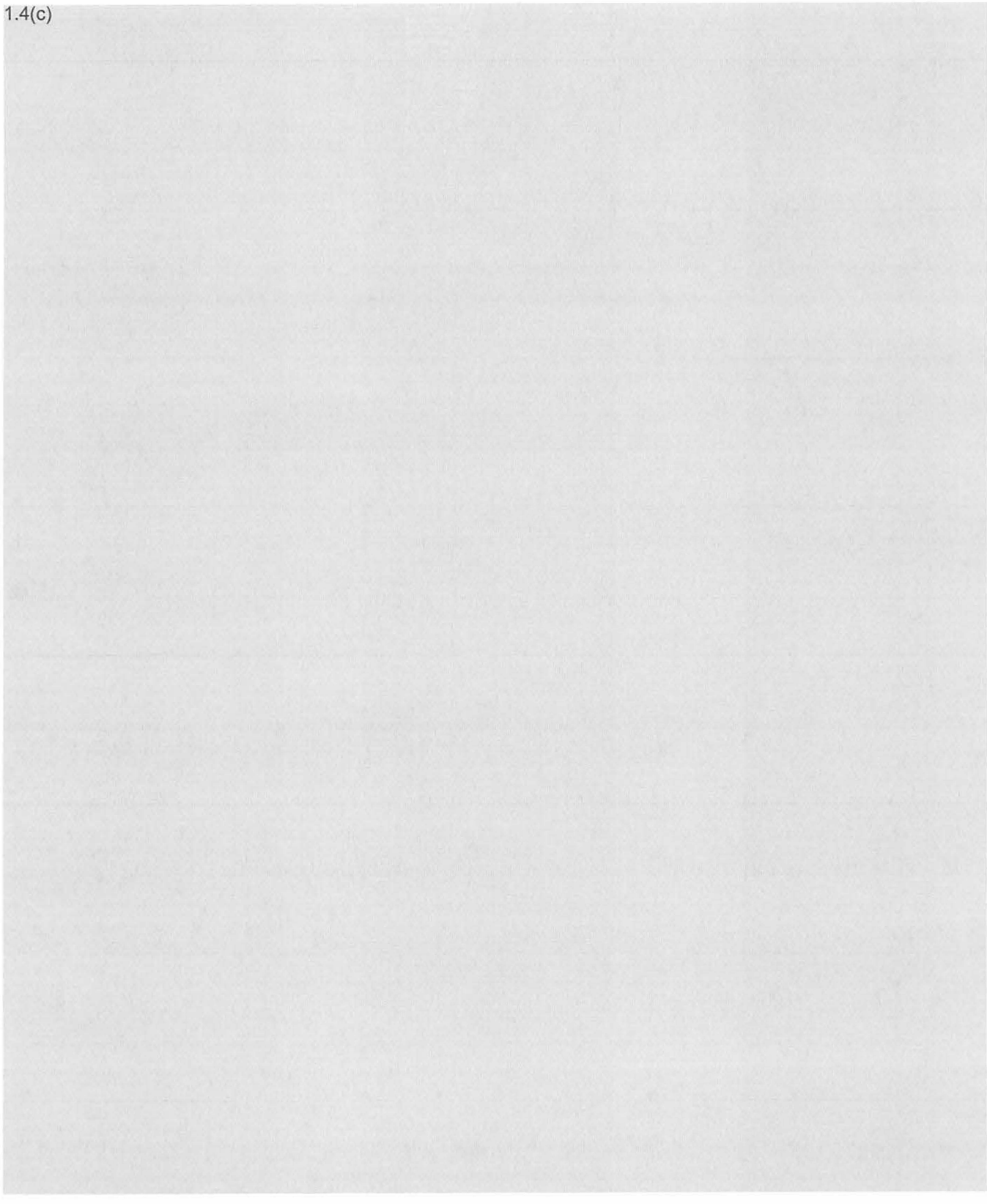

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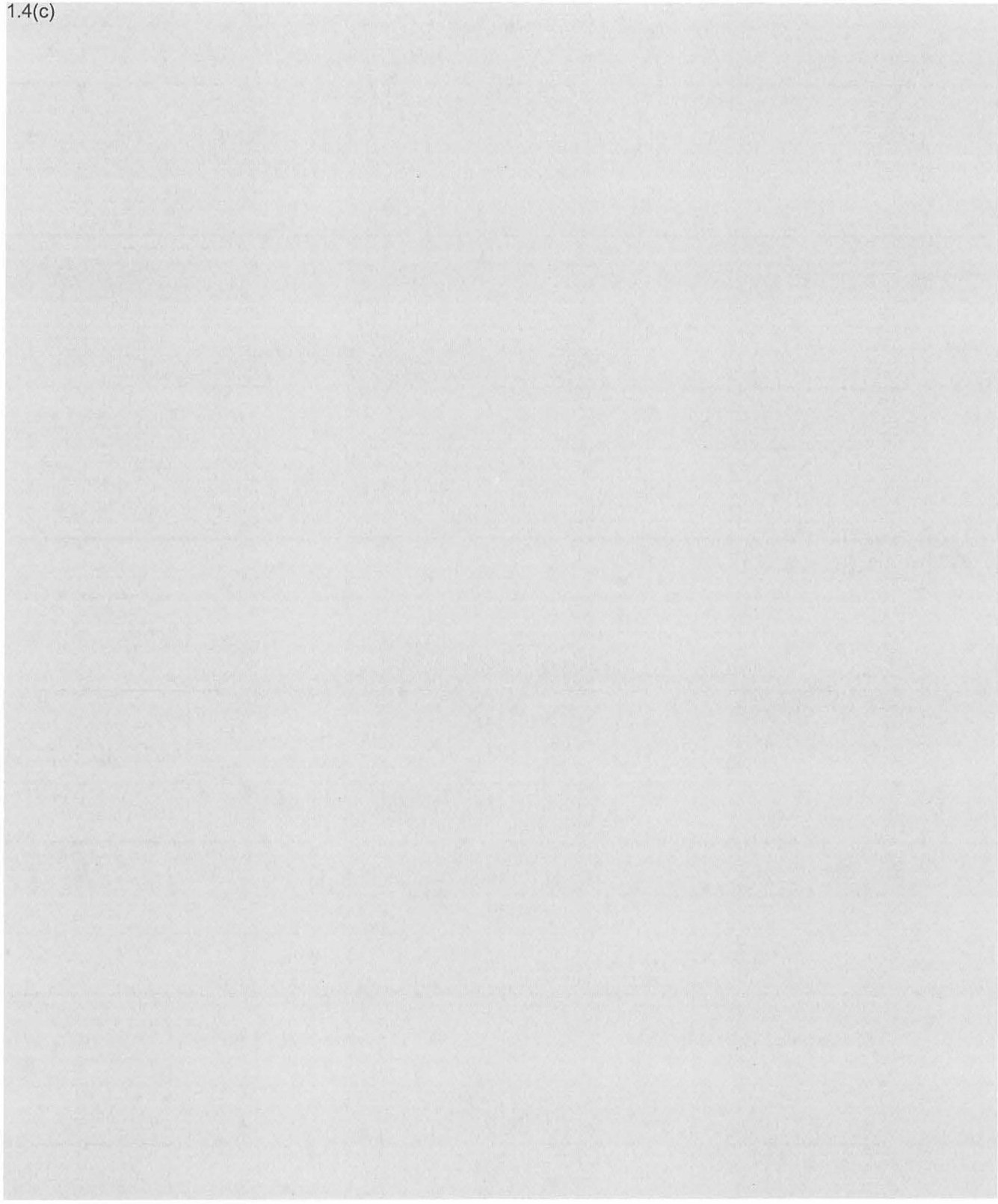

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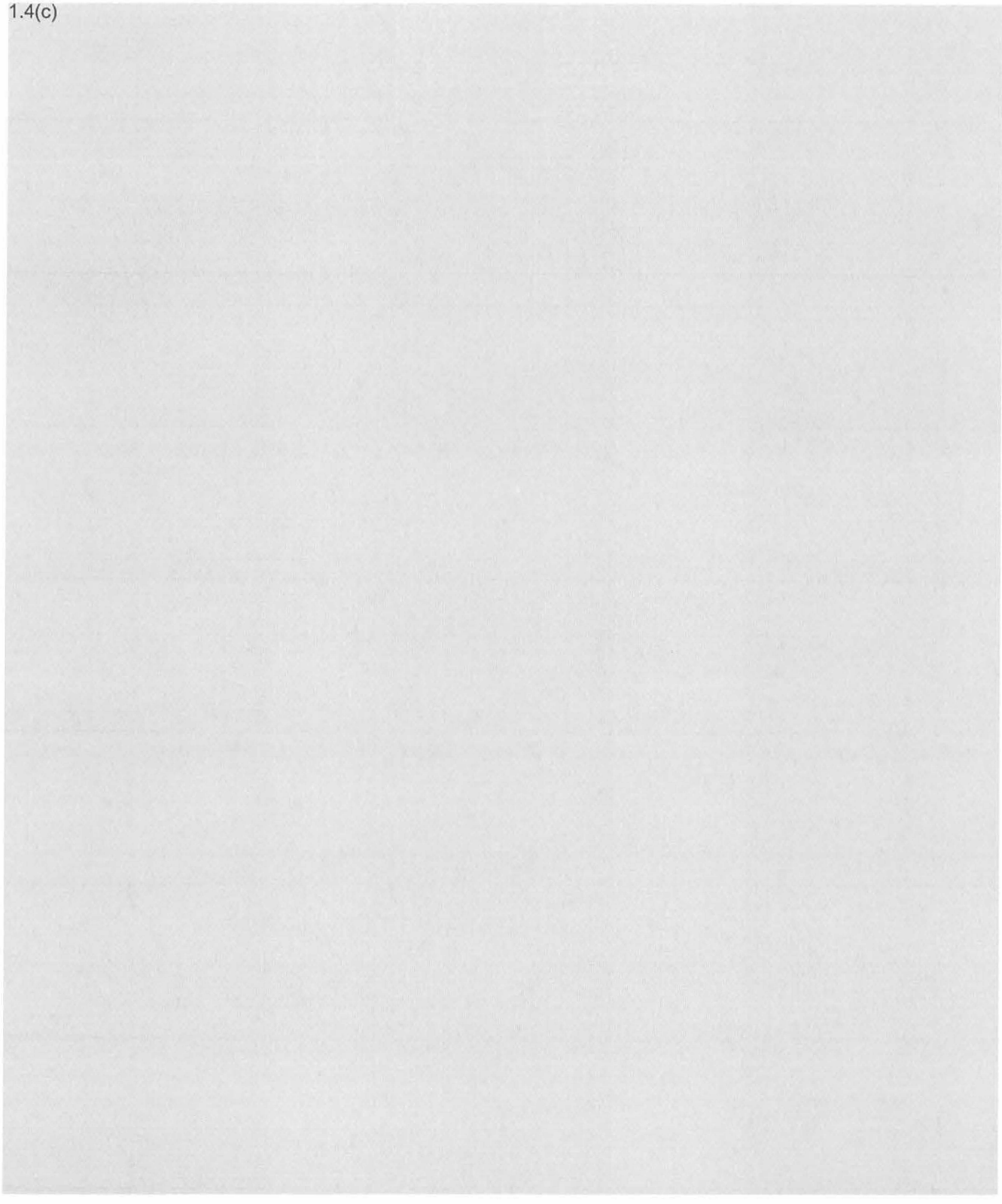

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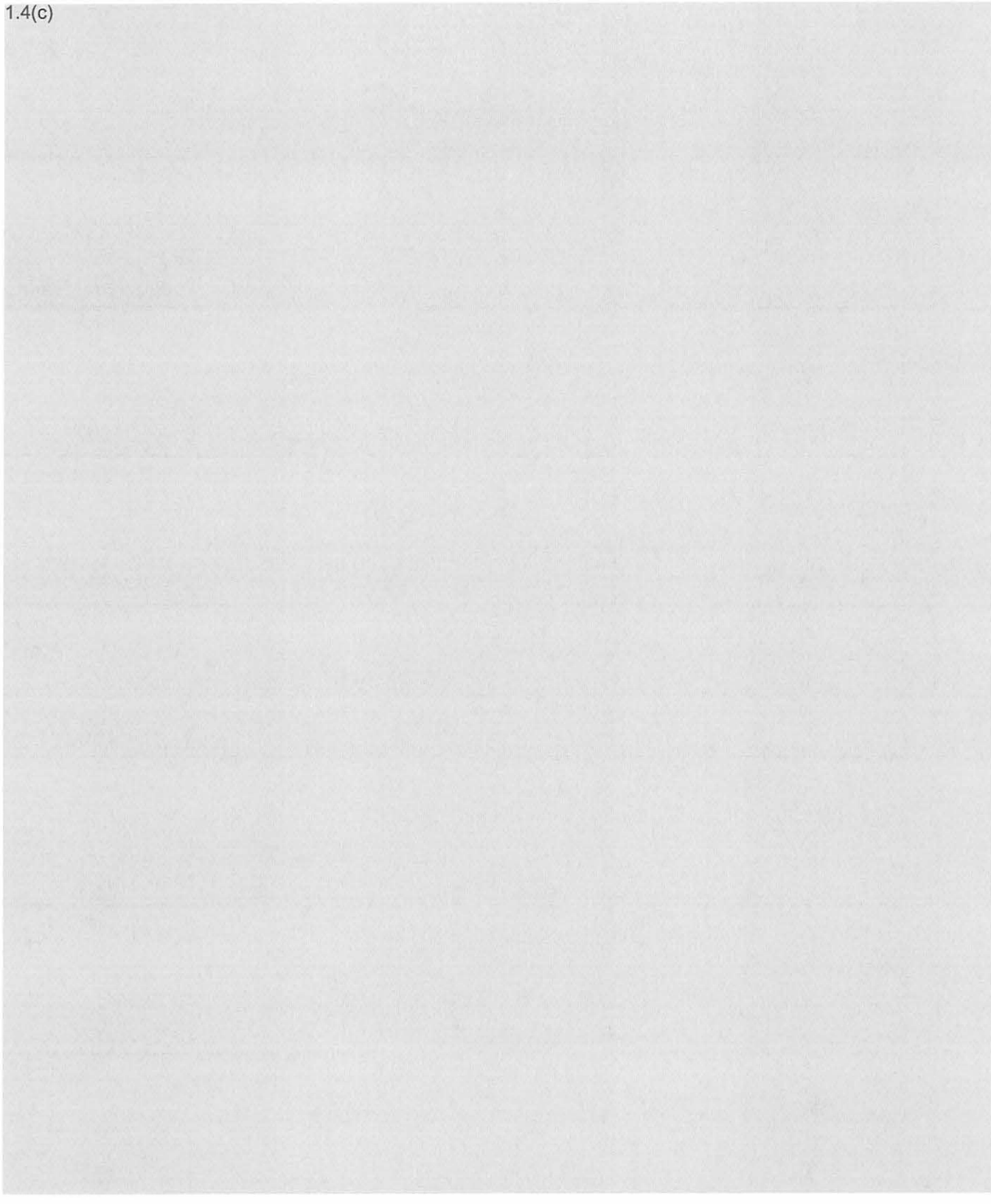

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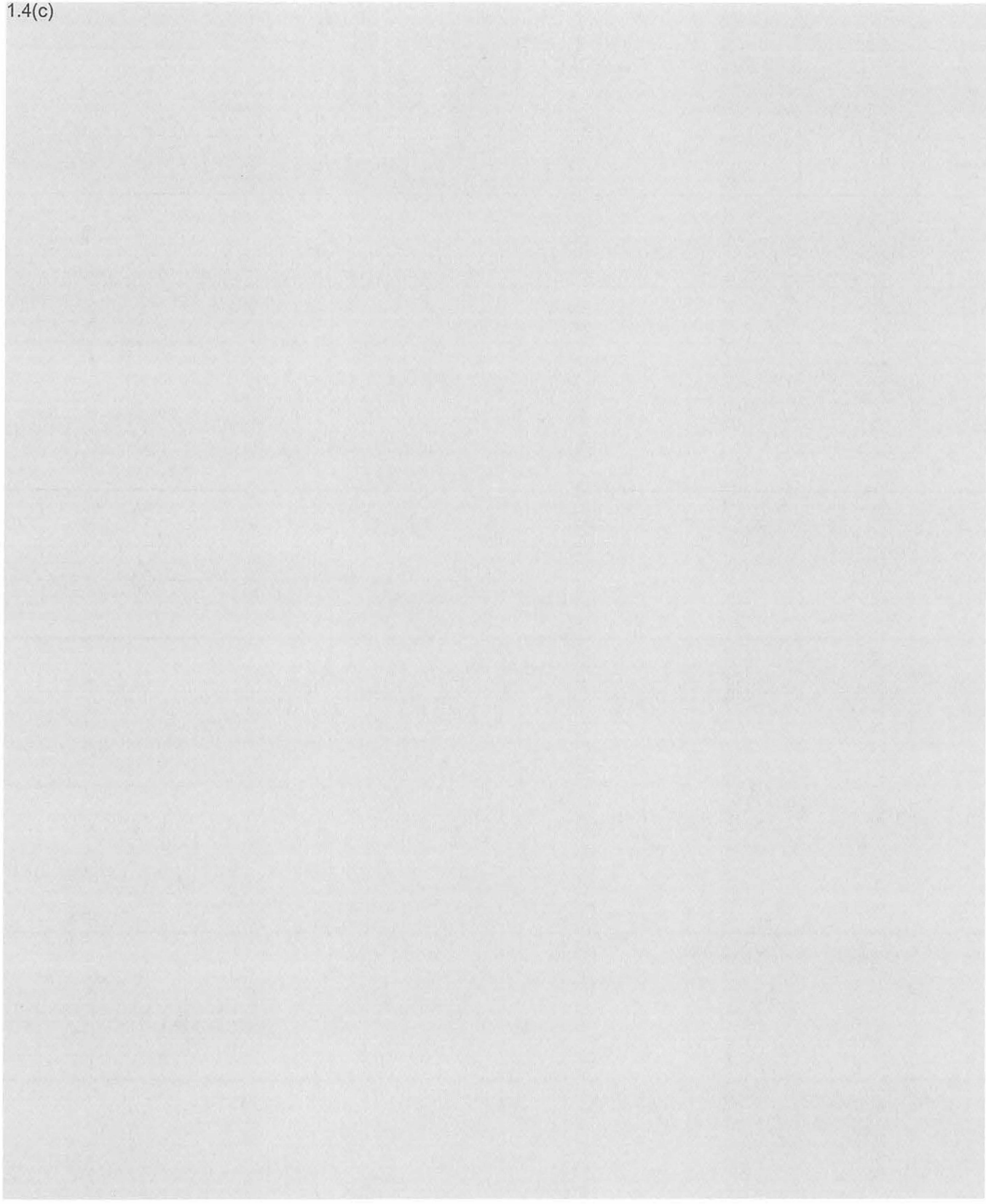

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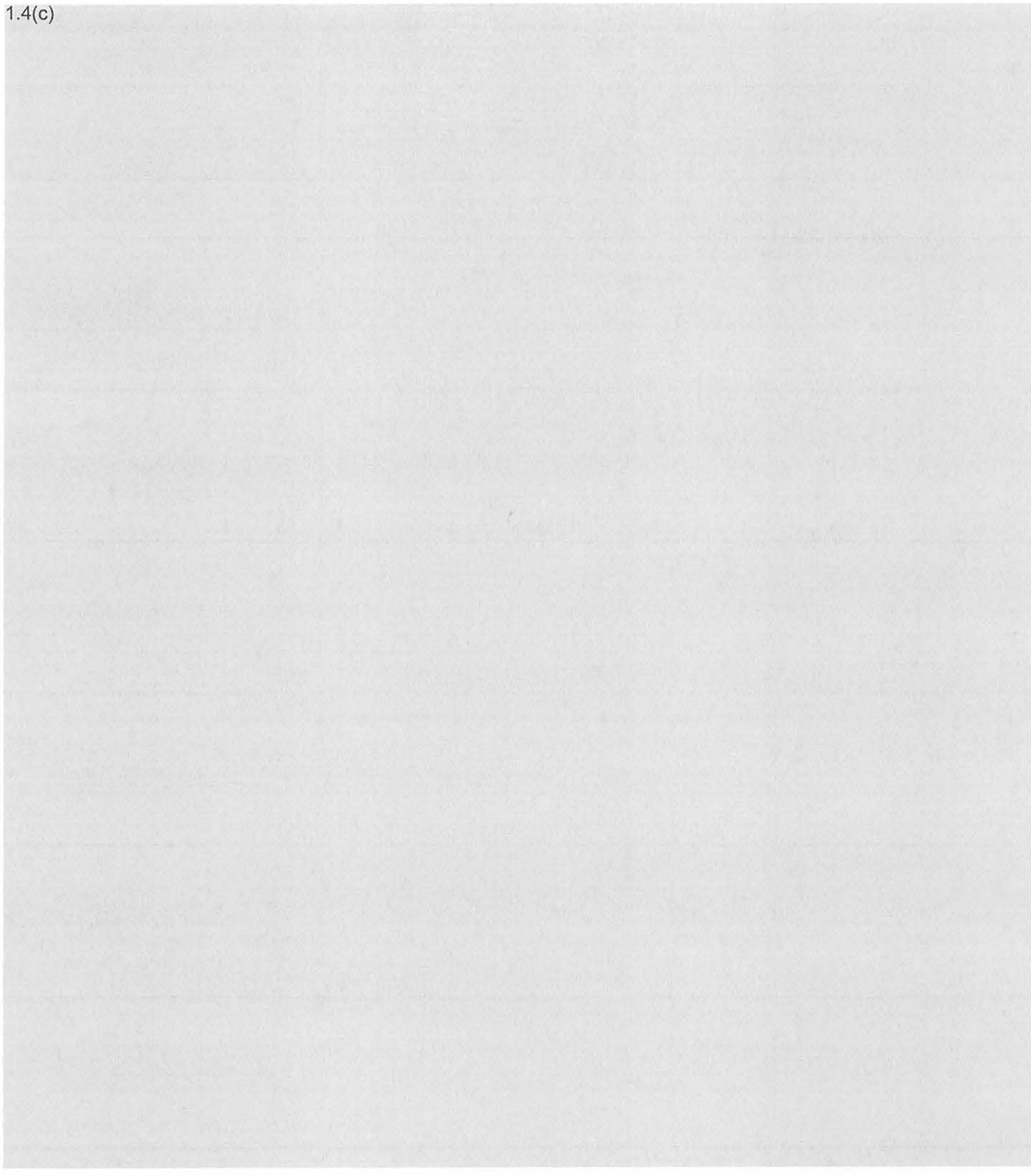

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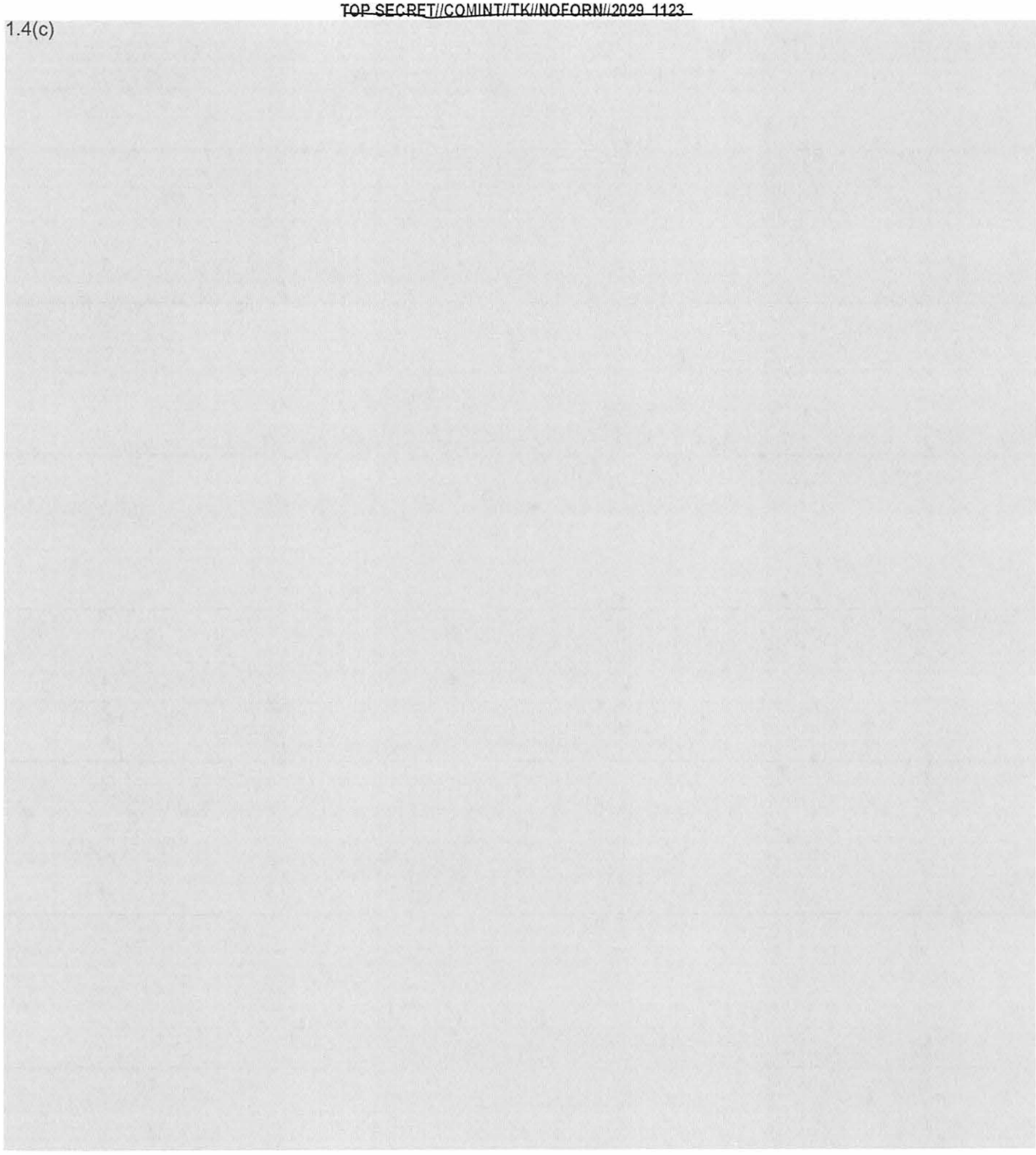


Appendix B

(U) This appendix is a summary listing of many of the various DEFSMAC automation projects from 1960 through 1999.

Approximate Year	Project Name	Computer Name	Program Function
1960s	PL 86-36/50 USC 3605		
1963		UNIVAC 490/494	Remote job entry for trajectory calculations
1965		IBM 360	Collection databases
1966		NSA Built	Convert track data for processing on IBM 7094
1966		IBM 7094	Trajectory calculations
1967		CDC 6400/6600	Follow-on to trajectory calculations on IBM 7094
1967			Trajectory graphics
1968		APD-30	Replaced PL
1968		IBM 360	Databases
1969		UNIVAC 490/494	Generalized software for DEFSMAC and NSOC
1969		UNIVAC 490/494	OPSCOMMs connected to PL for automatic data transfer
19__			FIS collection results database for DEFSMAC
1970s			
1970		UNIVAC 494	Front-end communications processor
1971		UNIVAC 494	Provided imagery summary data from CIA
1974 ?		UNIVAC 1100/83	Central computer for DEFSMAC and NSOC (Replaced PL
1975 ?		SEL 840MP	Graphics applications for DEFSMAC
1975*		DEC 10	Interactive graphics for missile/space flight paths (Replaced PL 86-36/50
1975			Retrieval of non-TK product reports
1976		IBM 370	Retrieval of ELINT data
1979		INCOTERM 20/40	Analytic terminal support system
1980s			
1980		PL 86-36/50 USC 3605	NSAs generalized packet switched comms network
1980			Scientific data processing
1985			Upgrade of several data communications systems
1987*			DEFSMAC development system

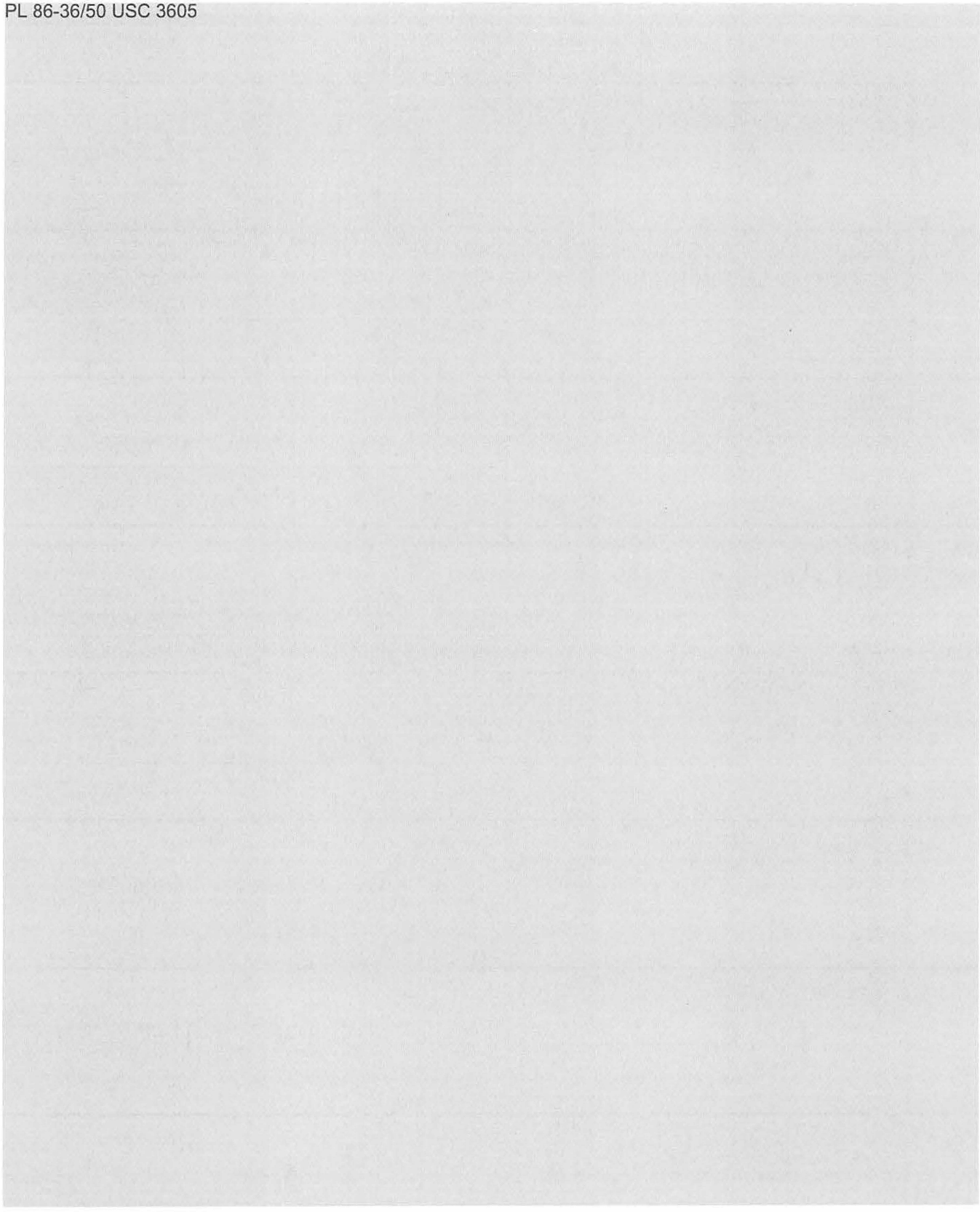
Approximate Year	Project Name	Computer Name	Program Function
1986	PL 86-36/50 USC 3605		DEFSMAC's application processing component (APC). Replaces PREFACE.
1987*			
1987*			Replaced PL (DEFSMAC clusters ANGEL and SWORD)
1987*			DEFSMAC databases
1987*			Input/Output to PL BM ASTW
1987*			Replaced hand sorting of incoming IDDF Messages
1987*			Artificial Intelligence for Watch Event Planning (IOC in 1990. Used in Desert Storm for IR)
1987*			Contractor (CSC) Developed Soviet Recon/ASAT Reporting (Cancelled in 1987)
1987*			
1987*			Graphics display of geoposition data. Replaces OMNIBUS-FLY among others
1987*			PL 86-36/50 Testbed and Host. (Upgraded to a part of W1 Analytical Distributed VAX 11/785 in 1989) processing system Has PLATFORM access.
1987*			Part of W1 Analytical Distributed (Has Britton-Lee processing system. Has IDM700 database) PLATFORM access.
1987*			
1987*			Replaces PL MOD 28s with ASTWs. Allows chatter OPSCOMS
1987*			Move of DEFMAC to 3rd floor (never happened)
1987			DSP Teletype user data entry terminal
1987*			OMNIBUS upgrade and replacement
1987			Replaced some TIDE SOCOMM and CRITICOM and some HOLDER links
1987*			Replacement of open source wews Mod 28s
1987*			Configuration mgmt of NTSS systems
1987*			Networks DEFSMAC to office of Space and Missiles Divisions
1986***			Primary NSA FIS data management system.
1989			DEFSMAC Local Network via BACKLIGHT HYPERchannel network
1989			Revised message ident. software for PL 86-36/50 USC 3605

Approximate Year	Project Name	Computer Name	Program Function
1989	PL 86-36/50 USC 3605		
1989			
1990s			
1990**			
1990**			
1990**			
1990**			
1990***			
1990**			
1990**			
1990**			
1990**			
1990**			
1999			
1999			

Notes:

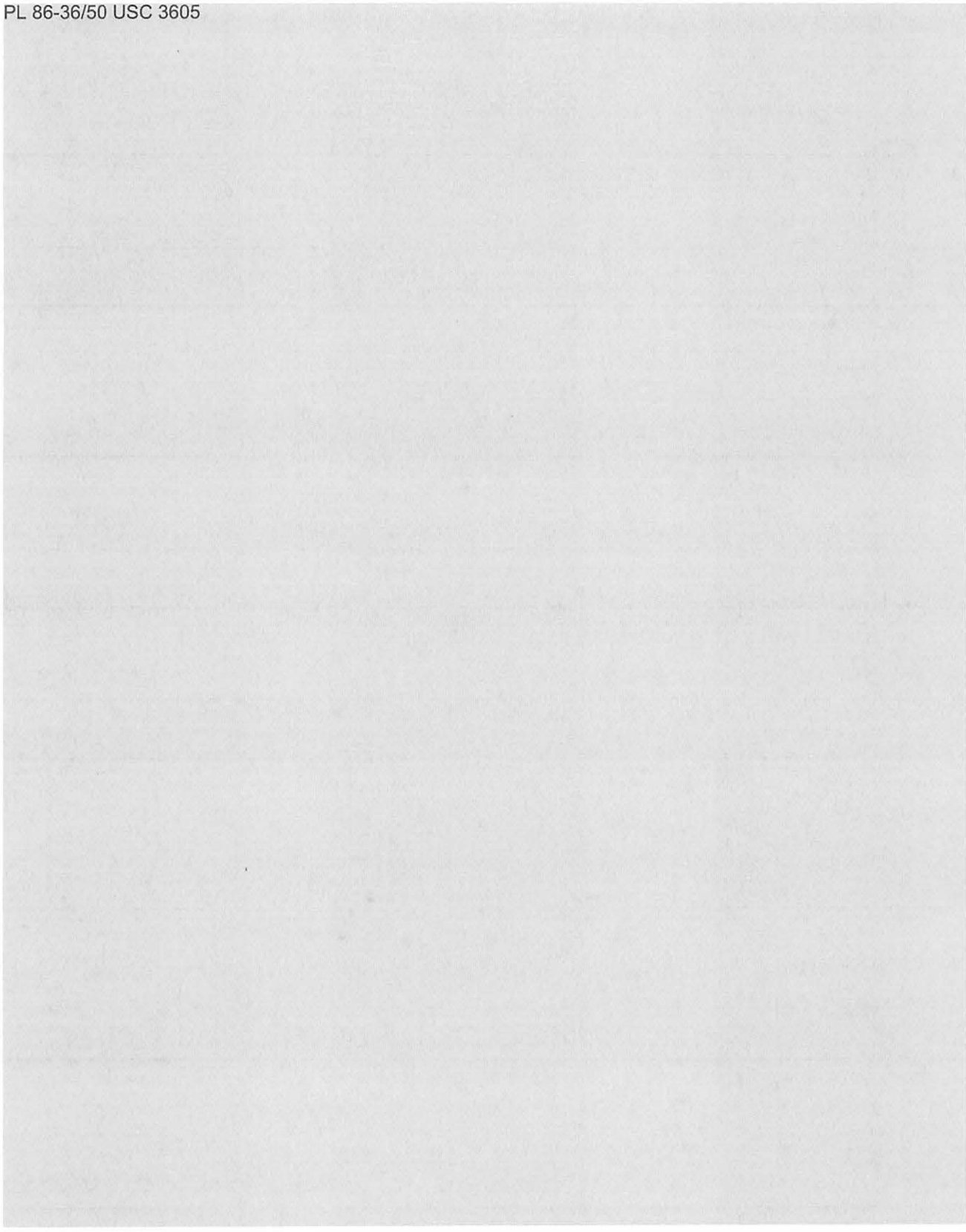
PL 86-36/50 USC 3605

PL 86-36/50 USC 3605



PL 86-36/50 USC 3605

PL 86-36/50 USC 3605



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(U) In addition to the interviews listed above, unclassified discussions and/or notes and photographs from retired NSA personnel and other government and industry personnel:

Mr. Joseph Amato, early USAFSS/SMITIG and NSA telemetry analyst and later manager and senior executive at NSA

Mr. PL 86-36/50 USC 3605 early USAF radar officer, USAF/ANEEG and NSA/COSA signal processing engineer, and later director DEFSMAC

Mr. David Norlander, formerly from EDL/ Sylvania involved in 1960s telemetry systems testing and operations

Dr. William "Bill" Perry, early Sylvania Electronic Defense Laboratory (EDL) systems engineer and manager, then the founder and chief executive of Electronic Systems Laboratories (ESL), and later to become the DoD Undersecretary for Defense Research and Engineering (DDR&E) and the U.S. Secretary of Defense

Mr. John Reese, formerly from EDL/Sylvania and ESL/TRW involved in early telemetry intelligence analysis and later system planning manager for telemetry collection/analysis systems

Mr. R. Steven Smith, a former DEFSMAC director (1992-1994) and long-time participant in FIS collection, operations, and management

Mr. Roger Stubblefield, early USAF/SMITG, USAF/ANEEG and NSA/COSA collection manager and signal processing and signal analysis manager

Dr. Albert "Bud" Wheelon, early Space Technology Laboratory (STL) scientist and later a CIA senior executive.

(U//FOUO) Extensive discussions and documents provided by DEFSMAC, NSA, or DIA personnel:

Mr. PL 86-36/50 USC 3605 W9D Associate Leader for Intelligence, who has over twenty-five years' experience with the DEFSMAC, Air Force and DIA TELINT reporting efforts

Mr. James M. Kline, W9D Associate Leader for Operations, who has over thirty-five years experience with TELINT collection and DEFSMAC operations efforts

Mr. Robert J. Richmond, W9D senior missile analyst, who has over thirty-five years' of experience in DEFSMAC missile analysis and reporting

Mr. Walter J. Stevens, W9D1 Technical Advisor, who has over thirty-five years' association with the NSA/CSS TELINT collection and DEFSMAC efforts

(U) NSA archived records and selected long- term storage and retired records in D32.

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(U) W Group partnership and Organizational files pertaining to missile and space activities; and related files in engineering/support organizations. e.g., K43

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(U//FOUO) Various CIA project histories, monographs, and extracts from the DDS&T History series. (In coordination with Mike Warner, CIA Center for the Study of Intelligence History Staff)

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(U) James Bamford, *Body Of Secrets – Anatomy of the Ultra-Secret National Security Agency*, New York: Random House, Inc., 2001. (A few brief discussions of telemetry and DEFSMAC.)

(U) James Bamford, *The Puzzle Palace – A Report on NSA, America's Most Secret Agency*, Boston, MA: Houghton Mifflin Company, Boston, 1982. (Contains several discussions on TELINT and DEFSMAC.)

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(U) Robert L. Brown, "Expert Witness," *Smithsonian Air and Space* magazine, November 2003, page 69. PL 86-36/50 USC 3605 [redacted]

(U) Ashton B. Carter and William J. Perry, *Preventive Defense – A New Security Strategy for America*, Washington, D.C.: Brookings Institution Press, 1999. (Discusses a pragmatic set of policies recommended by the authors for reducing foreign proliferation of weapons of mass destruction, a topic that Dr. Perry has pursued in one way or another during his entire career.)

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(U) Jeffrey T. Richelson, *The Wizards of Langley: Inside the CIA's Directorate of Science and Technology*, Cambridge, MA: Westview Press, Perseus Books Group, 2001. (Contains discussion PL 86-36/50 USC 3605 PL 86-36/50 USC 3605 the TACKSMAN sites in Iran, and the FMSAC. The book also alleges the U.S. had a base in Sinop, Turkey, a site named STONEHOUSE, and had access to information from PL 86-36/50 USC 3605 The book also claims that the U.S. and the PRC concluded an agreement in 1979 for the PRC to work with the U.S. in monitoring Soviet SALT compliance, with two FIS collection facilities.)

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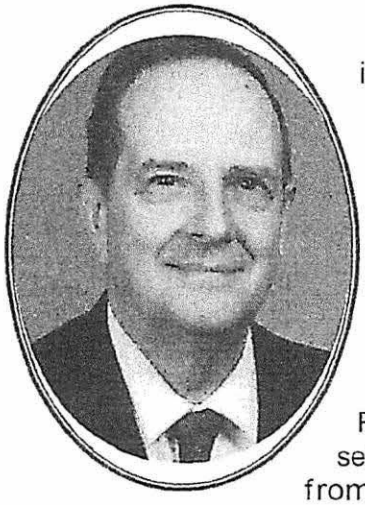

(U//FOUO) Mr. Bernard is a consultant and volunteer in the NSA Center for Cryptologic History. He is a retired NSA Senior Executive with over thirty years' experience in SIGINT, primarily as a program manager and executive for developing field collection and processing systems. He began his career at NSA as a USAF second lieutenant in 1953 in computer engineering. He became an NSA civilian employee in 1954.

(U//FOUO) After transferring to an R&D Office in 1960, Mr. Bernard held staff positions until he joined the R&D organization responsible for developing the fledgling set of systems, called SPACOL systems, to obtain telemetry from the rapidly emerging Soviet missile and space program. He was the project manager for PL 86-36/50 USC 3605 the original U.S. name for PL 86-36/50 USC 3605 and for many other new systems and upgrades to several other field systems. Mr. Bernard then continued to plan and develop many COMINT, ELINT, and TELINT line-of-sight field systems over the next several years; he became office chief and then deputy group chief of NSA line-of-sight system development organizations. In 1980 he became director of the Defense Special Missile and Astronautics Center (DEFSMAC) and held that position for three years. Mr. Bernard has an electrical engineering degree and a Master of Engineering Administration degree. He is professionalized as an Electronic Engineer and was a charter member of the NSA Senior Cryptologic Executive Service.